Electric Drives and Controls | Hydraulics | Linear Motion and Assembly Technologies | Pneumatics | Service

Rexroth
Bosch Group

Rexroth Tightening System 350

Easy Automation. Efficient Production.

Make way for tightening technology from Bosch Rexroth

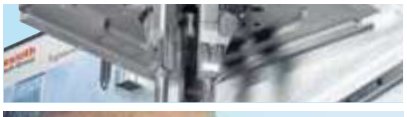
Bosch Rexroth tightening systems deliver outstanding dynamic qualities: innovative control electronics conduct a well-rehearsed orchestra of high-quality components. This harmonized group always beats to the same rhythm to ensure optimum tightening results by applying the right amount of force. No wonder really that our tightening systems are at home in production plants throughout the world.

Contents







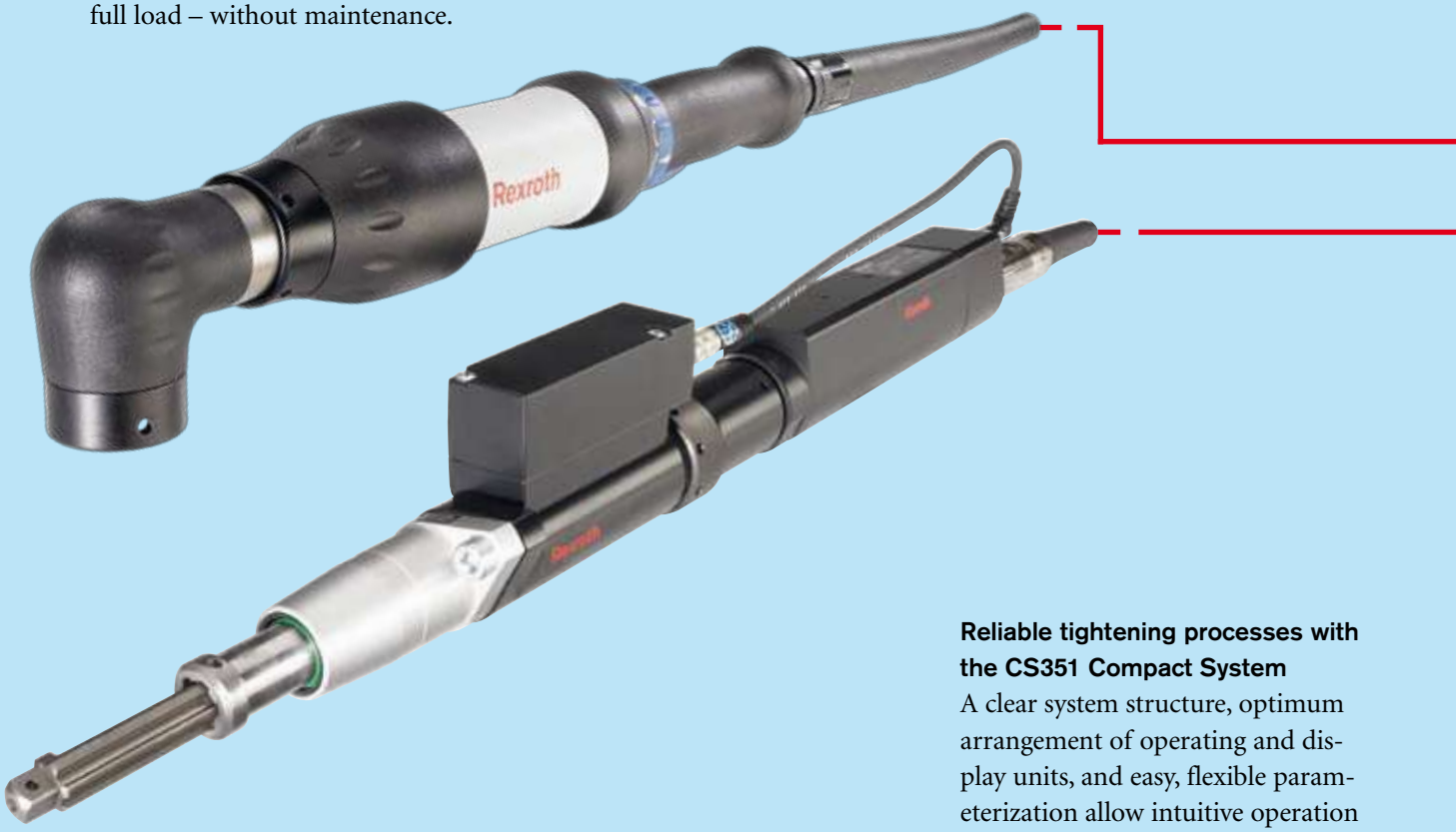
Secure Connections

Strong yet flexible, securely connected yet separable – high-tech based on tradition.

We don't always see mechanical joints, but they are all around us: tightening connections that ensure safety and performance. The mechanical simplicity of screws makes them one of the most reliable material connections.
Tightening systems from Rexroth supply the exact amount of force required, the main requirement for these connections. They combine intuitive applications and efficient operation with the most reliable tightening results.

CS351 Compact System
Single-channel tightening system for ErgoSpin or tightening spindle

High quality, high availability
ErgoSpin hand-held nutrunners and Rexroth tightening spindles are tested in endurance tests of more than a million tightenings under full load – without maintenance.



ErgoSpin hand-held nutrunner or tightening spindle
The CS351 Compact System is available in two versions: for the operation of a ErgoSpin hand-held nutrunner or for the operation of a tightening spindle.

Reliable tightening processes with the CS351 Compact System
A clear system structure, optimum arrangement of operating and display units, and easy, flexible parameterization allow intuitive operation from the controller to the tool. Fast and secure commissioning increases flexibility when adapting to new tasks; this significantly reduces the total cost of ownership (TCO).

Compact and powerful

- Secure and fast commissioning
- Tightening results at a glance
- Sturdy: IP54, EMC severity level IV
- USB and Ethernet-based bus systems

The PC software's menu-assisted user interface makes system programming easy.

Compact System variants with high-resolution TFT and touchscreen for selecting tightening programs, changing parameter and displays.

Integrated logic
With the integration of flexibly programmable logic in compliance with IEC 61131-3, users have countless automation options available for the entire tightening process: from assembly supply and process control to worker guidance.

Compact System Variants for ErgoSpin:

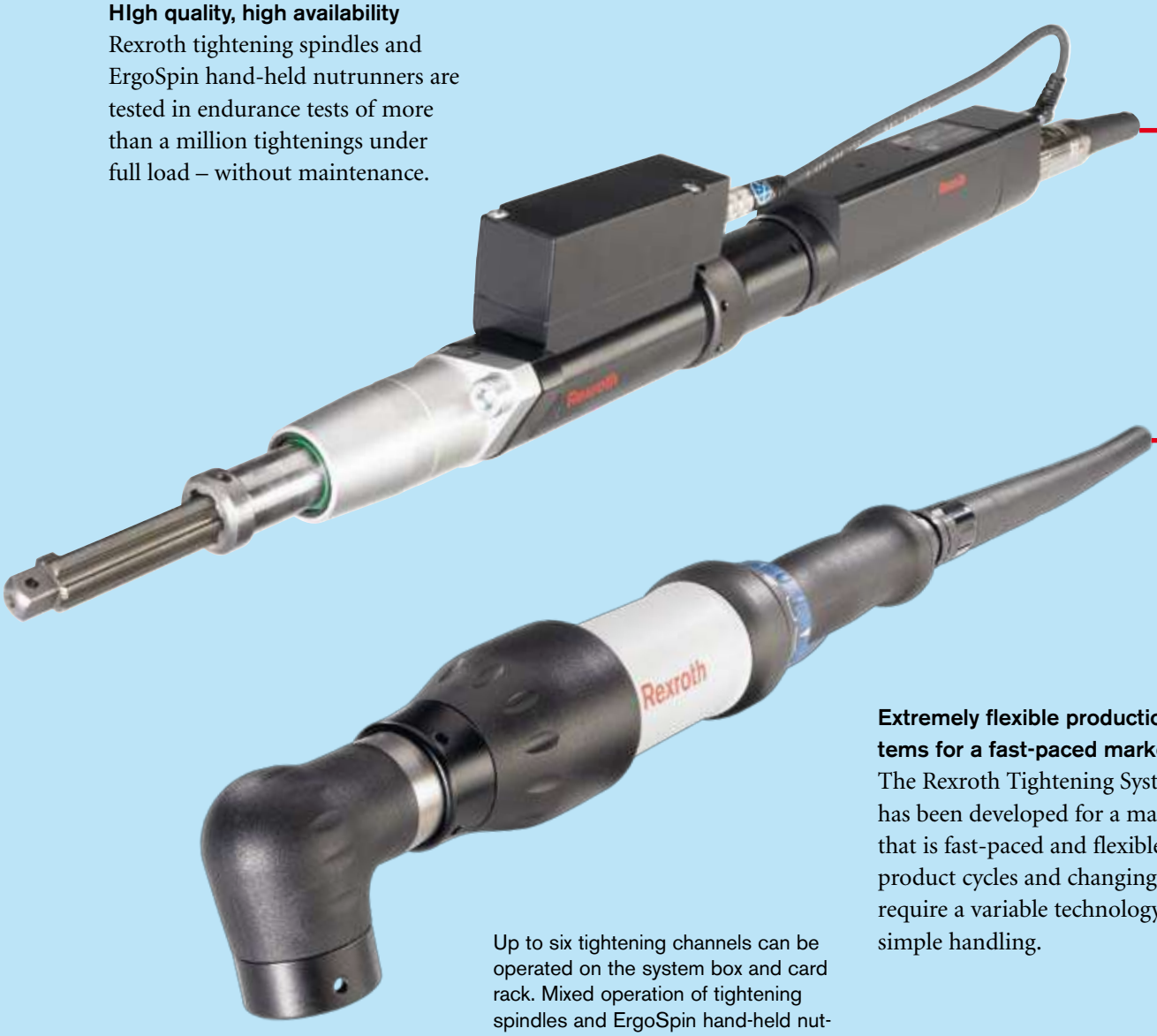
CS351E-G
CS351E-D
CS351E-G IL
CS351E-D IL
CS351E-D NK

Compact System Variants for Tightening Spindles:

CS351S-G
CS351S-D
CS351S-G IL
CS351S-D IL
CS351S-D NK

Modular System 350
Multi-channel tightening system for tightening spindles and ErgoSpin

HIgh quality, high availability
Rexroth tightening spindles and ErgoSpin hand-held nutrunners are tested in endurance tests of more than a million tightenings under full load – without maintenance.



Up to six tightening channels can be operated on the system box and card rack. Mixed operation of tightening spindles and ErgoSpin hand-held nutrunners is possible at the same time due to the common control platform.

The system is upgradeable to up to 40 tightening channels.

Extremely flexible production systems for a fast-paced market
The Rexroth Tightening System 350 has been developed for a market that is fast-paced and flexible. Short product cycles and changing tasks require a variable technology with simple handling.

High packing density

- Up to 6 tightening channels per system box/ card rack
- Networking of up to 40 tightening channels
- Combination of tightening spindles/ErgoSpin
- Integrated logic
- Control cabinet-free with SB356

The PC software's menu-assisted user interface makes system programming easy.

Modular principle
Control system and tightening spindle have been developed as a modular system, which ensures an optimal construction of the tightening system using standard components. Retrofitting can be done easily at any time. This modularity ensures easy system installation.

BT356 card rack or SB356 system box
Servo amplifiers (LT), control units (SE), and the communication unit (KE) form a compact and powerful unit in the BT356/SB356 slots. As an alternative to the BT356 card rack, the SB356 system box is available for tightening systems without a control cabinet.

Perfect connection
A single connection cable suffices to connect the tightening spindle and servo amplifier. This cable provides both the power supply and communication. Distances of up to 100 meters can be safely bridged.

Integrated logic
With the integration of flexibly programmable logic in compliance with IEC 61131-3, users have countless automation options available for the entire tightening process: from assembly supply and process control to worker guidance.

From Tightening Position to Tightening System

In industrial production, every tightening situation is different. This is why Rexroth tightening systems adapt to the individual requirements of each company. The Rexroth Tightening System 350 is available in a wide, perfectly scalable product range in a cutting-edge industrial design.

The powerful and ergonomic hand-held nutrunners of the ErgoSpin series promise workers a fatigue-free working environment.

The modular tightening spindles can be combined in many variants suitable for the tightening task at hand. Rexroth not only offers the components but complete solutions, from hand-held tightening systems to fully-automatic tightening stations which can be seamlessly integrated into production lines.

Along with consultation, planning, production, startup, personnel training, and maintenance of the entire system, Rexroth also provides system responsibility for your complex requirements.

Five Steps to Your Tightening Solution

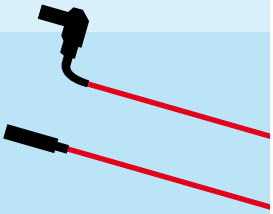
The right nutrunner for your tightening job

1 Nutrunner selection

Control and power electronics

2 Compact and modular control concepts

Cables for interference-free, digital data transfer

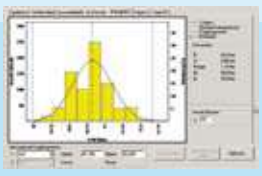


3 Cable selection

Interface modules for perfect network connection

4 Interface module selection

The right software for all tightening jobs



5 BS350 Operating System

Generating tightening programs, changing parameters, tightening case analyses, system tests

IndraWorks

For all automation solutions in the entire tightening position

Modular and Versatile:
The Rexroth Tightening Spindles

You can have both:
reliable tightening results and efficient operation. The Rexroth tightening spindles demonstrate this fact in industrial applications. Whether hand-held or in fully automatic environments: Rexroth tightening spindles perform tightenings critical to safety and function in serial production – precisely and dependably. A perfect coordination of configuration, measurement processing, analysis, and documentation ensure this high level of quality.

High quality, high availability
Rexroth tightening spindles are tested in endurance tests of more than a million tightenings under full load – without maintenance.

Tightening Spindles 0.6 – 1000 Nm

Tightening Spindles for every application

The modular construction of the Rexroth tightening spindles enables a very precise adjustment to the tightening task at hand. Conformity with the VDI standard ensures that your tightening connections meet the highest safety requirements. The versatility of Rexroth tightening spindles not only guarantees safety but also a perfect design customized to your needs.

Tightening spindle with spindle bearing and redundant measurement transducer

- Easy installation
- Increased system assurance
- Universal modular principle for highly flexible production systems
- Individually upgradeable

Tightening spindle with angle head

- For high accessibility
- Also available with integrated measurement transducer

Tightening spindle with offset output drive

- For successful multiple connections with small center-to-center distances
- Also available with integrated measurement transducer

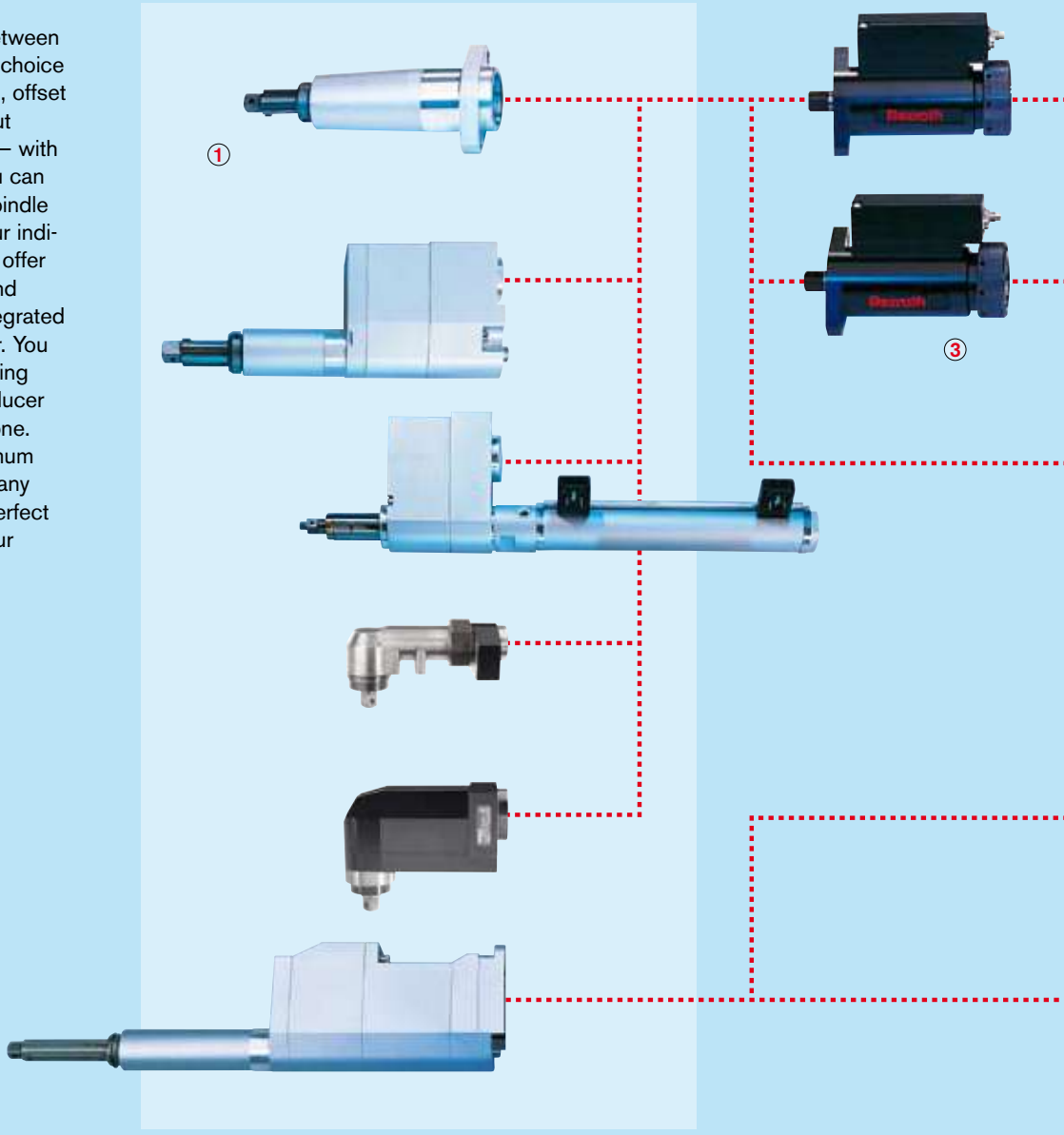
Tightening spindle with transverse gearbox

- Compact length
- Available for all sizes

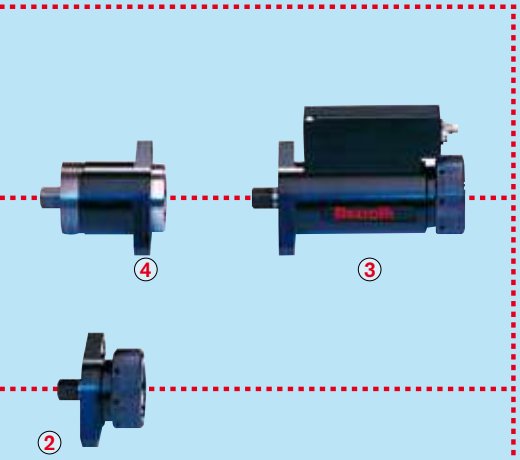
Configure Your Tightening Spindle

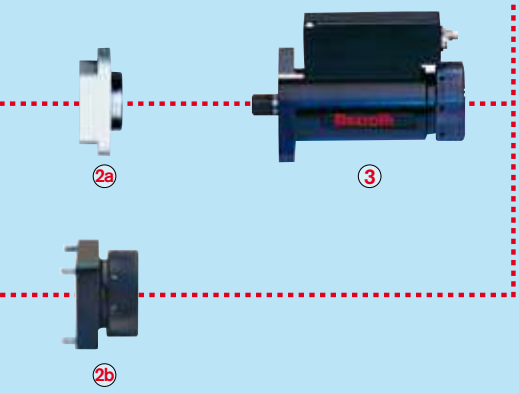
Numerous options

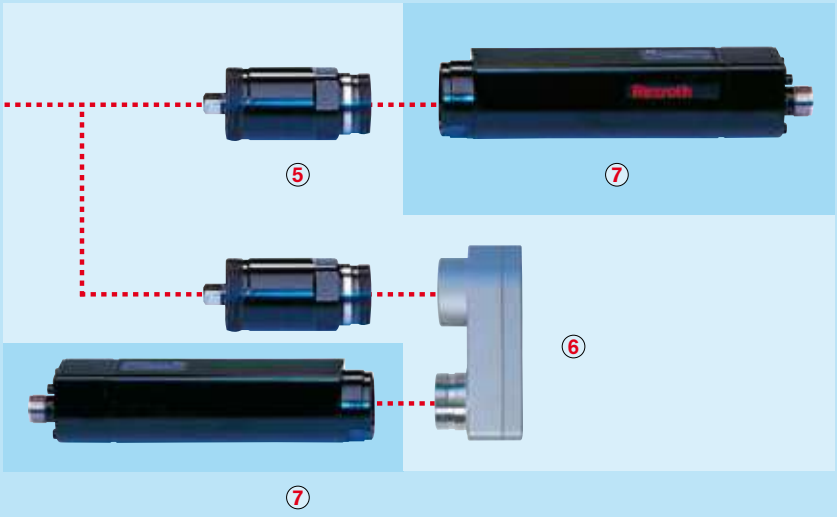
With a working range between 0.6 and 1000 Nm and a choice between spindle bearing, offset output drives, feed output drives, and angle heads – with Rexroth components you can configure a tightening spindle that is customized to your individual requirements. We offer the offset output drive and angle head also with integrated measurement transducer. You can decide between having one measurement transducer or a second redundant one. We can deliver the optimum spindle components for any task. Why not find the perfect tightening spindle for your tightening connection?



Depending on the size, the actual components may differ from those in the illustration.







① Output drives
- The suitable output drive for every tightening position
- Special output drives for increased transverse forces, e.g. for wheel nutrunners, on request

② Adapter A
- Connects planetary gearbox and output drive when operating without a measurement transducer

②a AVR redundant adapter
- Connects an offset output drive with integrated transducer to a measurement transducer

②b AVG adapter
- Connects the output drive and the planetary gearbox

③ Measurement transducer
- Non-contact, maintenance-free sensors
- Direct analysis of torque, angle of turn, and gradient
- Integrated cycle counter
- Can be used as a redundant transducer to improve system assurance

④ AR redundant adapter
- Connects 2 measurement transducers

⑤ Planetary gearbox
- Several gearboxes per series to achieve short tightening times

⑥ Transverse gearbox
- Reduction of installation length

⑦ EC motor
- Reliable
- Short tightening times
- Excellent dynamics
- Side-by-side arrangement due to low outer dimensions
- High density and power efficiency

Finding the Suitable Tightening Spindle

The specifications. An example: door hinge tightening

	Requirement
Torque/tolerance:	25 Nm/±10%
Number of tightening spindles:	2x
center-to-center distance:	30 mm
Tool mount:	3/8" square
Screw-in depth:	30 mm
Measurement transducer:	Measurement of torque and angle of turn as close as possible to the screw (no gearbox between measurement transducer and screw)
Tightening time:	As short as possible

From the torque to the size

	Requirement	Solution	Page
Torque/tolerance:	25 Nm/±10%	Tightening spindle BG3	from p. 22

From the tightening position to the output drive

	Requirement	Solution	Page
Number of tightening spindles:	2x		
center-to-center distance:	30 mm	Offset output drive	
Tool mount:	3/8" square	3/8" square	
Screw-in depth:	30 mm	Range of spring up to 50 mm	from p. 22

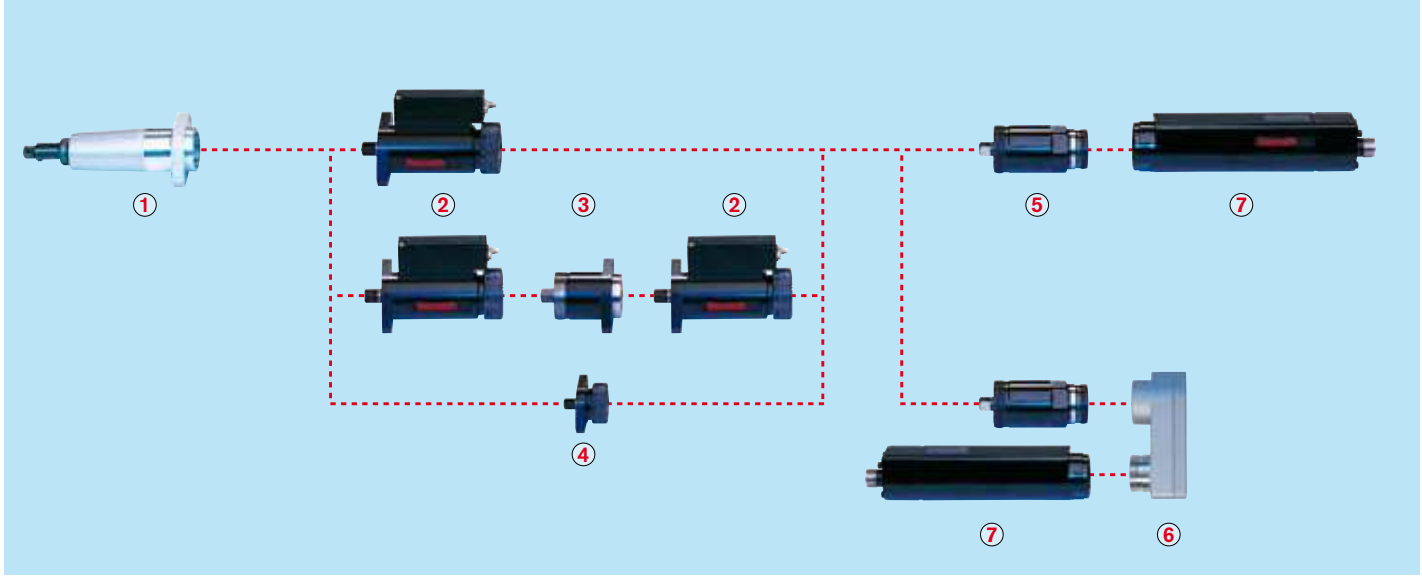
Safety first – measurement transducers

	Requirement	Solution	Components
Measurement transducer	Measurement of torque and angle of turn as close as possible to the screw (no gearbox between measurement transducer and screw)	Offset output drive with integrated measurement transducer	3VMC035

Dynamic with suitable gearbox and EC motor

	Requirement	Solution	Components
Tightening time	As short as possible	High speed	3GE67+EC303

Tightening Spindles Size 2
Spindle Bearing
0.6 – 10 Nm



① 'A'

Spindle bearing

Code	2GA82	2GB82
Order no.	0 608 800 077	0 608 800 078
Max. torque	10 Nm	10 Nm
Range of spring	20 mm	20 mm
Reduction	1	1
Avg. efficiency	1	1
Length A	82 mm	82 mm
Installation length	90 mm	90 mm
Weight	0.2 kg	0.2 kg

② **Measurement transducer**

Code	2DMC006	2DMC012
Order no.	0 608 820 110	0 608 820 111
Nominal torque	6 Nm	12 Nm
Reduction	1	1
Avg. efficiency	1	1
Installation length	118.5 mm	118.5 mm
Weight	0.55 kg	0.55 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 2AR adapter.
For measurement transducer cables, see page 100.

③ **Redundant adapter**

Code	2AR
Order no.	
Reduction	1
Avg. efficiency	1
Installation length	50 mm
Weight	0.3 kg

When configuring with a redundant measurement transducer, the 2AR adapter connects both measurement transducers.

④ **Adapter**

Code	2A
Order no.	0 608 810 024
Reduction	1
Typ. efficiency	1
Installation length	30 mm
Weight	0.4 kg

When configuring without a measurement transducer, the 2A adapter connects the output drive and the planetary gearbox.

⑤ **Planetary gearbox**

Code	2GE19	2GE26
Order no.	0608720043	0608720038
Reduction	18.9	25.5
Avg. efficiency	0.9	0.9
Installation length	50.9 mm	50.9 mm
Weight	0.4 kg	0.4 kg

⑥ **Transverse gearbox**

Code	2ULG
Order no.	0 608 PE0 282
Reduction	1
Avg. efficiency	0.9
Installation length	28.3 mm
Weight	0.4 kg

The 2ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑦ **EC motor**

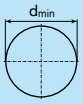
Code	EC302
Order no.	0 608 701 016
Installation length	197 mm
Weight	0.72 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth spindle bearing

- Various lengths with axial compensator
- Standard tool mounts
- Maximum efficiency
- Easy assembly due to flange connection
- Maintenance-free for 1 million full load cycles

Side-by-side arrangement of tightening spindles (center-to-center distance)



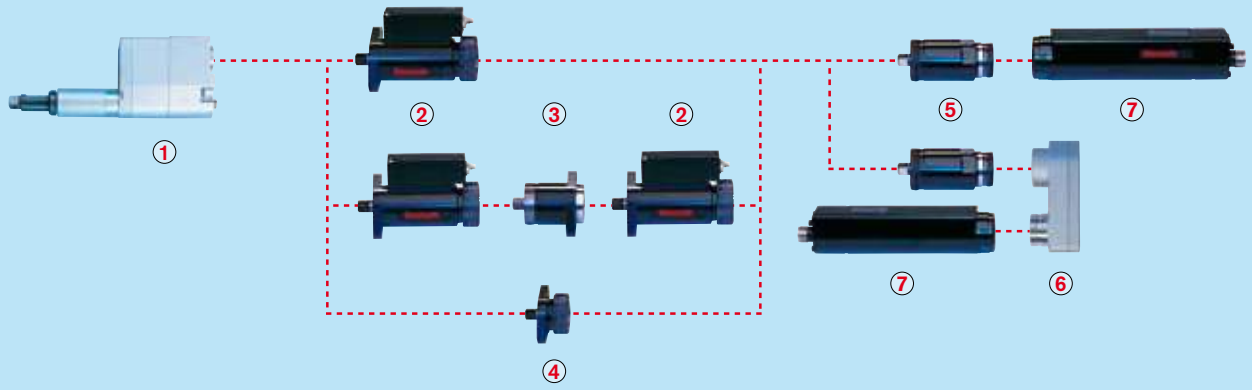
Number of tightening spindles	2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	35	40	55	64	74

Tightening spindle		Spindle Bearing				Measurement transducer	Planetary gearbox	EC motor
Working range * [Nm]	**Max. output drive speed** [1/min]	**Range of spring** [mm]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**	**Code / Order no.**
0.6–5.5	1000	20	1/4" square	2GA82	0 608 800 077	2DMC006	2GE19	EC302
	1000	20	1/4" quick-change chuck	2GB82	0 608 800 078	0 608 820 110	0 608 720 043	0 608 701 016
	780	20	1/4" square	2GA82	0 608 800 077		2GE26	
	780	20	1/4" quick-change chuck	2GB82	0 608 800 078		0 608 720 038	
1.2–10	1000	20	1/4" square	2GA82	0 608 800 077	2DMC012	2GE19	
	1000	20	1/4" quick-change chuck	2GB82	0 608 800 078	0 608 820 111	0 608 720 043	
	780	20	1/4" square	2GA82	0 608 800 077		2GE26	
	780	20	1/4" quick-change chuck	2GB82	0 608 800 078		0 608 720 038	

* Accuracy is limited if operating below the working range.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Tightening Spindles Size 2 Offset Output Drive 0.6 – 10 Nm



① Offset output drive

Code	2VNA82	2VNB82
Order no.	0 608 800 607	0 608 800 608
Max. torque	10 Nm	10 Nm
Range of spring	20 mm	20 mm
Reduction	1	1
Typ. efficiency	0.90	0.90
Length A	82 mm	82 mm
Installation length	153 mm	153 mm
Weight	0.6 kg	0.6 kg

② Measurement transducer

Code	2DMC006	2DMC012
Order no.	0 608 820 110	0 608 820 111
Nominal torque	6 Nm	12 Nm
Reduction	1	1
Typ. efficiency	1	1
Installation length	118.5 mm	118.5 mm
Weight	0.55 kg	0.55 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 2AR adapter.
For measurement transducer cables, see page 100.

③ Redundant adapter

Code	2AR
Order no.	0 608 810 020
Reduction	1
Typ. efficiency	1
Installation length	50 mm
Weight	0.3 kg

When configuring with a redundant measurement transducer, the 2AR adapter connects both measurement transducers.

④ Adapter

Code	2A
Order no.	0 608 810 024
Reduction	1
Typ. efficiency	1
Installation length	30 mm
Weight	0.4 kg

When configuring without a measurement transducer, the 2A adapter connects the output drive and the planetary gearbox.

⑤ Planetary gearbox

Code	2GE19	2GE26
Order no.	0608720043	0608720038
Reduction	18.9	25.5
Typ. efficiency	0.9	0.9
Installation length	50.9 mm	50.9 mm
Weight	0.4 kg	0.4 kg

⑥ Transverse gearbox

Code	2ULG
Order no.	0 608 PE0 282
Reduction	1
Typ. efficiency	0.9
Installation length	28.3 mm
Weight	0.4 kg

The 2ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑦ EC motor

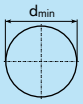
Code	EC302
Order no.	0 608 701 016
Installation length	197 mm
Weight	0.72 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth offset output drive

- For tight hole templates
- Standard tool mounts
- Easy assembly due to flange connection
- Maintenance-free for 1 million full load cycles

Side-by-side arrangement of tightening spindles (center-to-center distance)



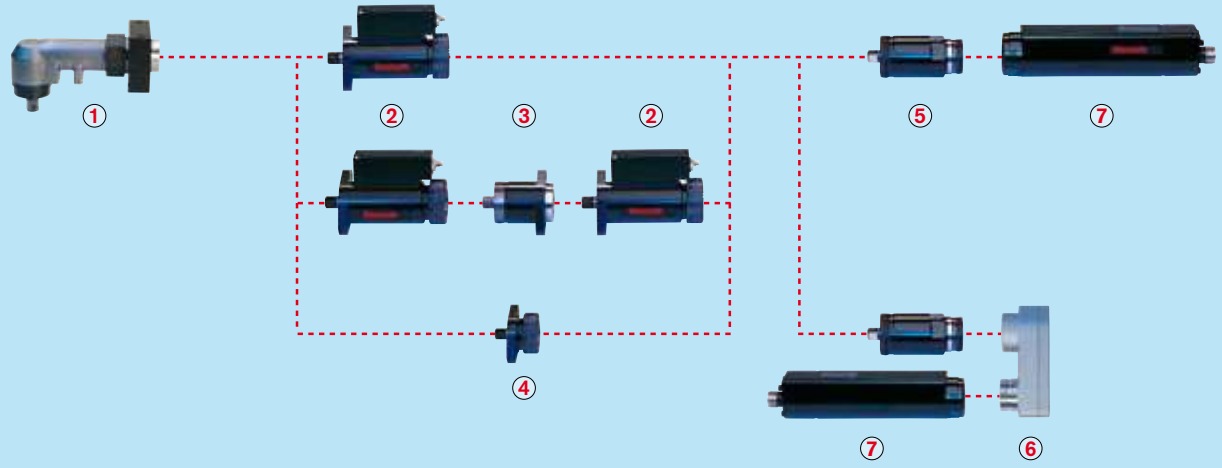
Number of tightening spindles	2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	23	27	33	41	52

Tightening spindle		Offset Output Drive				Measurement transducer	Planetary gearbox	EC motor
Working range * [Nm]	**Max. output drive speed** [1/min]	**Range of spring** [mm]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**	**Code / Order no.**
0.6–5	1000	20	1/4" square	2VNA82	0 608 800 607	2DMC006	2GE19	EC302
	1000	20	1/4" quick-change chuck	2VNB82	0 608 800 608	0 608 820 110	0 608 720 043	0 608 701 016
	780	20	1/4" square	2VNA82	0 608 800 607		2GE26	
	780	20	1/4" quick-change chuck	2VNB82	0 608 800 608		0 608 720 038	
1.2–10	1000	20	1/4" square	2VNA82	0 608 800 607	2DMC012	2GE19	
	1000	20	1/4" quick-change chuck	2VNB82	0 608 800 608	0 608 820 111	0 608 720 043	
	780	20	1/4" square	2VNA82	0 608 800 607		2GE26	
	780	20	1/4" quick-change chuck	2VNB82	0 608 800 608		0 608 720 038	

* Accuracy is limited if operating below the working range.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Tightening Spindles Size 2
Angle head
0.6 – 11 Nm



① Angle head

Code	2W11
Order no.	0 608 810 041
Max. torque	11 Nm
Reduction	1.05
Typ. efficiency	0.95
Installation length	81.5 mm
Weight	0.7 kg

② Measurement transducer

Code	2DMC006	2DMC012
Order no.	0 608 820 110	0 608 820 111
Nominal torque	6 Nm	12 Nm
Reduction	1	1
Typ. efficiency	1	1
Installation length	118.5 mm	118.5 mm
Weight	0.55 kg	0.55 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 2AR adapter.
For measurement transducer cables, see page 100.

③ Redundant adapter

Code	2AR
Order no.	0 608 810 020
Reduction	1
Typ. efficiency	1
Installation length	50 mm
Weight	0.3 kg

When configuring with a redundant measurement transducer, the 2AR adapter connects both measurement transducers.

④ Adapter

Code	2A
Order no.	0 608 810 024
Reduction	1
Typ. efficiency	1
Installation length	30 mm
Weight	0.4 kg

When configuring without a measurement transducer, the 2A adapter connects the output drive and the planetary gearbox.

⑤ Planetary gearbox

Code	2GE19	2GE26
Order no.	0 608 720 043	0 608 720 038
Reduction	18.9	25.5
Typ. efficiency	0.9	0.9
Installation length	50.9 mm	50.9 mm
Weight	0.4 kg	0.4 kg

⑥ Transverse gearbox

Code	2ULG
Order no.	0 608 PE0 282
Reduction	1
Typ. efficiency	0.9
Installation length	28.3 mm
Weight	0.4 kg

The 2ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑦ EC motor

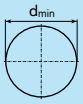
Code	EC302
Order no.	0 608 701 016
Installation length	197 mm
Weight	0.72 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth angle head

- For restricted accessibility
- Precision toothing for high torque accuracy
- Incremental positioning
- Integrated fastening flanges
- With integrated measurement transducer on request

Side-by-side arrangement of tightening spindles (center-to-center distance)

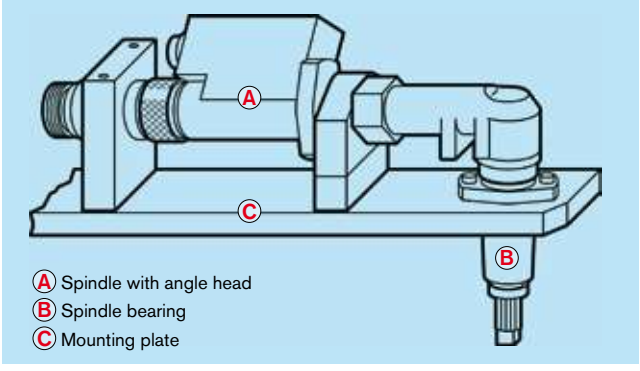


Number of tightening spindles	2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	26	30	36	44	52

Tightening spindle		Angle head			Measurement transducer	Planetary gearbox	EC motor
Working range * [Nm]	**Max. output drive speed** [1/min]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**	**Code / Order no.**
0.6–5.5	1000	1/4" square	2W11	0 608 810 041	2DMC006 0 608 820 110	2GE19 0 608 720 043	EC302 0 608 701 016
	740	1/4" square	2W11	0 608 810 041		2GE26 0 608 720 038	
1.2–11	1000	1/4" square	2W11	0 608 810 041	2DMC012 0 608 820 111	2GE19 0 608 720 043	
	740	1/4" square	2W11	0 608 810 041		2GE26 0 608 720 038	

* Accuracy is limited if operating below the working range.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

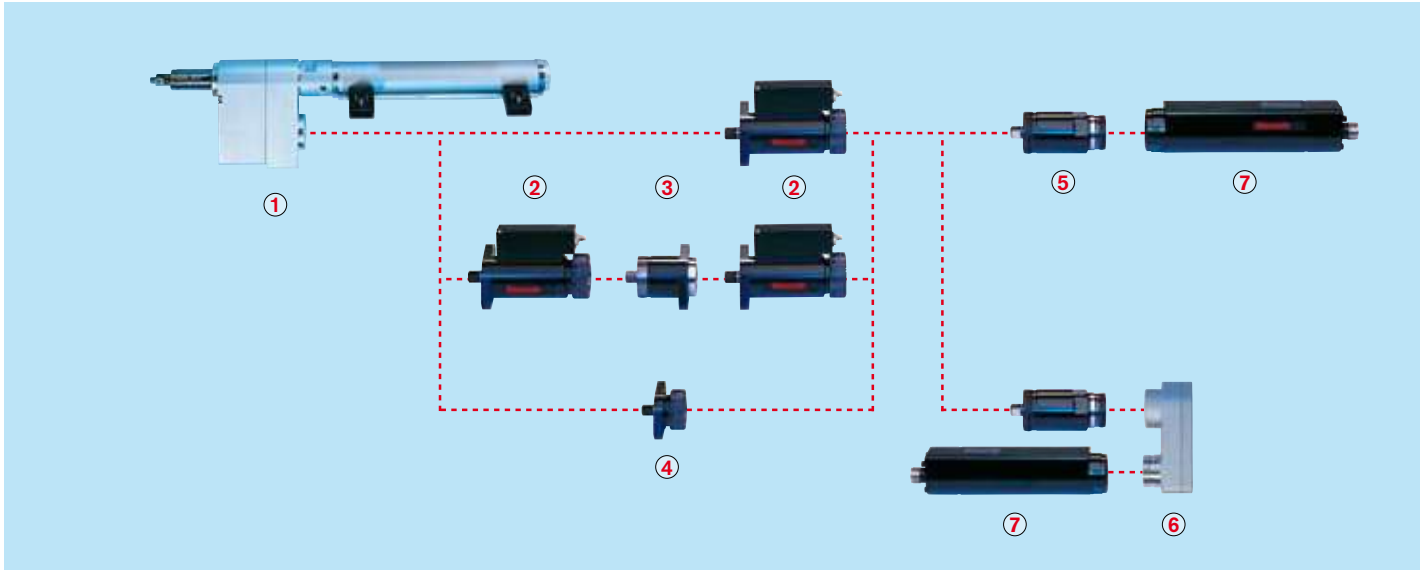


Ⓐ Spindle with angle head
Ⓑ Spindle bearing
Ⓒ Mounting plate

Angle head with spindle bearing

Axial compensator
To ensure troublefree operation, the angle head always has to be operated with an output drive axial compensator e.g. spindle bearing.
You can find more information in the project management guide for angle heads in the Rexroth media directory at www.boschrexroth.com/medienverzeichnis

Tightening Spindles Size 2
Feed Output Drive
0.6 – 10 Nm



① Feed output drive

Code	2S1	2S2
Order no.	0 608 800 612	0 608 800 619
Max. torque	10 Nm	7 Nm
Stroke	160 mm	160 mm
Max. air pressure	4 bar	4 bar
Reduction	1	1
Typ. efficiency	0.93	0.93
Length A	80 mm	80 mm
Installation length	189.5 mm	189.5 mm
Weight	2 kg	2 kg

② Measurement transducer

Code	2DMC006	2DMC012
Order no.	0 608 820 110	0 608 820 111
Nominal torque	6 Nm	12 Nm
Reduction	1	1
Typ. efficiency	1	1
Installation length	118.5 mm	118.5 mm
Weight	0.55 kg	0.55 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 2AR adapter.
For measurement transducer cables, see page 100.

③ Redundant adapter

Code	2AR
Order no.	0 608 810 020
Reduction	1
Typ. efficiency	1
Installation length	50 mm
Weight	0.3 kg

When configuring with a redundant measurement transducer, the 2AR adapter connects both measurement transducers.

④ Adapter

Code	2A
Order no.	0 608 810 024
Reduction	1
Typ. efficiency	1
Installation length	30 mm
Weight	0.4 kg

When configuring without a measurement transducer, the 2A adapter connects the output drive and the planetary gearbox.

⑤ Planetary gearbox

Code	2GE19	2GE26
Order no.	0 608 720 043	0 608 720 038
Reduction	18,9	25,5
Typ. efficiency	0.9	0.9
Installation length	50.9 mm	50.9 mm
Weight	0.4 kg	0.4 kg

⑥ Transverse gearbox

Code	2ULG
Order no.	0 608 PE0 282
Reduction	1
Typ. efficiency	0.9
Installation length	28.3 mm
Weight	0.4 kg

The 2ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑦ EC motor

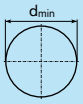
Code	EC302
Order no.	0 608 701 016
Installation length	197 mm
Weight	0.72 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth feed output drive

- Integrated feed movement
- In connection with automatic screw supply
- Standard tool mounts and compressed air connections
- Easy assembly due to flange connection
- Maintenance-free for 1 million full load cycles

Side-by-side arrangement of tightening spindles (center-to-center distance)



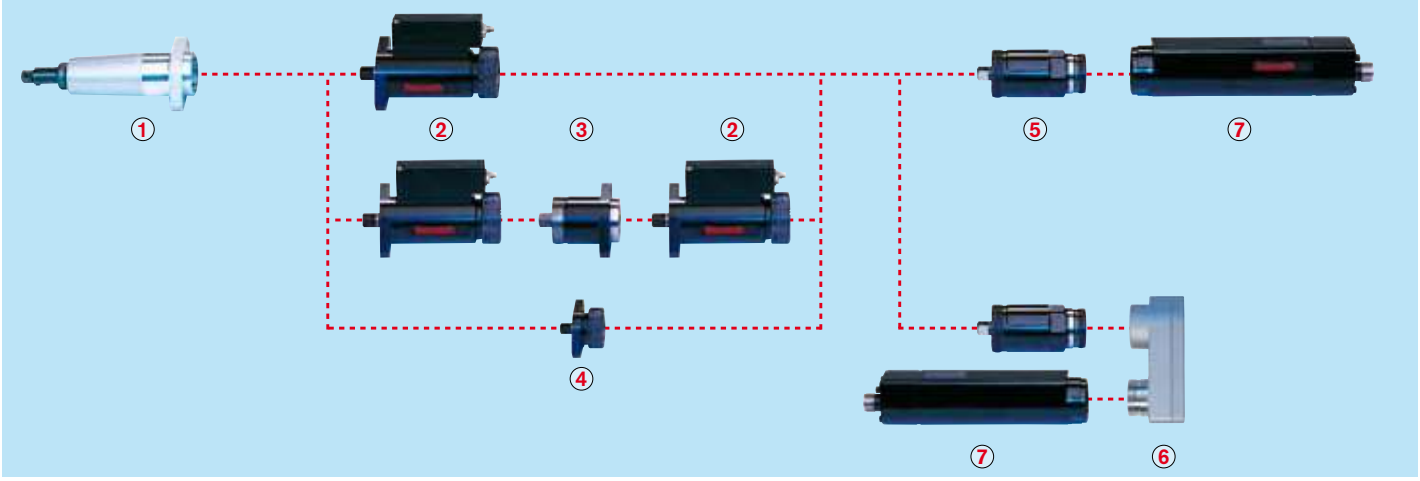
Number of tightening spindles	2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	33	38	46	55	65

Tightening spindle			Feed Output Drive			Measurement transducer	Planetary gearbox	EC motor
Working range * [Nm]	**Max. output drive speed** [1/min]	**Stroke** [mm]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**	**Code / Order no.**
0.6–5	1000	160	1/4" square	2S1	0 608 800 612	2DMC006 0 608 820 110	2GE19 0 608 720 043	EC302 0 608 701 016
			M6 outer thread	2S2	0 608 800 619			
	780	160	1/4" square	2S1	0 608 800 612		2GE26 0 608 720 038	
			M6 outer thread	2S2	0 608 800 619			
1.2–7	1000	160	M6 outer thread	2S2	0 608 800 619	2DMC012 0 608 820 111	2GE19 0 608 720 043	
	780	160	M6 outer thread	2S2	0 608 800 619		2GE26 0 608 720 038	
1.2–10	1000	160	1/4" square	2S1	0 608 800 612		2GE19 0 608 720 043	
	780	160	1/4" square	2S1	0 608 800 612		2GE26 0 608 720 038	

* Accuracy is limited if operating below the working range.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Tightening Spindles Size 3
Spindle Bearing
1.7 – 55 Nm



① 

Spindle Bearing

Code	G1B102	G2B152	G1A102	G1C102	G2A152	G2C152
Order no.	0 608 800 063	0 608 800 065	0 608 800 062	0 608 800 072	0 608 800 064	0 608 800 073
Max. torque	35 Nm	35 Nm	55 Nm	55 Nm	55 Nm	55 Nm
Range of spring	25 mm	50 mm	25 mm	25 mm	50 mm	50 mm
Reduction	1	1	1	1	1	1
Typ. efficiency	1	1	1	1	1	1
Length A	102 mm	152 mm	102 mm	102 mm	152 mm	152 mm
Installation length	112 mm	162 mm	112 mm	112 mm	162 mm	162 mm
Weight	0.33 kg	0.41 kg	0.33 kg	0.33 kg	0.41 kg	0.41 kg

② 

Measurement transducer

Code	3DMC017	3DMC060
Order no.	0 608 820 112	0 608 820 113
Nominal torque	17 Nm	60 Nm
Reduction	1	1
Typ. efficiency	1	1
Installation length	118.6 mm	118.6 mm
Weight	1 kg	1 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 3AR adapter.
For measurement transducer cables, see page 100.

③ 

Redundant adapter

Code	3AR
Order no.	0 608 810 021
Reduction	1
Typ. efficiency	1
Installation length	57 mm
Weight	0.4 kg

When configuring with a redundant measurement transducer, the 3AR adapter connects both measurement transducers.

④ 

Adapter

Code	3A
Order no.	0 608 810 025
Reduction	1
Typ. efficiency	1
Installation length	30.5 mm
Weight	0.3 kg

When configuring without a measurement transducer, the 3A adapter connects the output drive and the planetary gearbox.

⑤ 

Planetary gearbox

Code	3GE27	3GE67
Order no.	0 608 720 053	0 608 720 039
Reduction	27	67.4
Typ. efficiency	0.9	0.85
Installation length	65.5 mm	81.5 mm
Weight	0.5 kg	0.5 kg

⑥ 

Transverse gearbox

Code	3ULG
Order no.	0 608 PE0 283
Reduction	1
Typ. efficiency	0.9
Installation length	30.1 mm
Weight	0.5 kg

The 3ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑦ 

EC motor

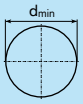
Code	EC303
Order no.	0 608 701 017
Installation length	219 mm
Weight	1.3 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth spindle bearing

- Various lengths with axial compensator
- Standard tool mounts
- Maximum efficiency
- Easy assembly due to flange connection
- Maintenance-free for 1 million full load cycles

Side-by-side arrangement of tightening spindles (center-to-center distance)



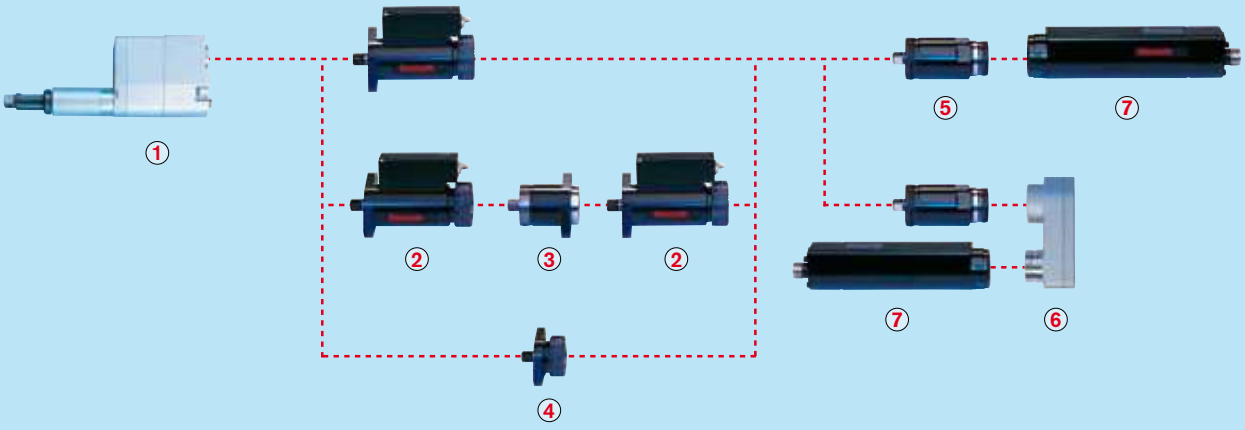
Number of tightening spindles	2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	45	52	65	80	89

Tightening spindle		Spindle Bearing				Measurement transducer	Planetary gearbox	EC motor
Working range * [Nm]	**Max. output drive speed** [1/min]	**Range of spring** [mm]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**	**Code / Order no.**
1.7–16	740	25	3/8" square	G1A102	0 608 800 062	3DMC017 0 608 820 112	3GE27 0 608 720 053	EC303 0 608 701 017
			1/4" quick-change chuck	G1B102	0 608 800 063			
			3/8" square with centering pin	G1C102	0 608 800 072			
		50	3/8" square	G2A152	0 608 800 064			
			1/4" quick-change chuck	G2B152	0 608 800 065			
			3/8" square with centering pin	G2C152	0 608 800 073			
	295	25	3/8" square	G1A102	0 608 800 062	3DMC017 0 608 820 112	3GE67 0 608 720 039	
			1/4" quick-change chuck	G1B102	0 608 800 063			
			3/8" square with centering pin	G1C102	0 608 800 072			
		50	3/8" square	G2A152	0 608 800 064			
			1/4" quick-change chuck	G2B152	0 608 800 065			
			3/8" square with centering pin	G2C152	0 608 800 073			
6–32	740	25	3/8" square	G1A102	0 608 800 062	3DMC060 0 608 820 113	3GE27 0 608 720 053	
			1/4" quick-change chuck	G1B102	0 608 800 063			
			3/8" square with centering pin	G1C102	0 608 800 072			
		50	3/8" square	G2A152	0 608 800 064			
			1/4" quick-change chuck	G2B152	0 608 800 065			
			3/8" square with centering pin	G2C152	0 608 800 073			
6–35	295	25	1/4" quick-change chuck	G1B102	0 608 800 063	3DMC060 0 608 820 113	3GE67 0 608 720 039	
		50	1/4" quick-change chuck	G2B152	0 608 800 065			
6–55	295	25	3/8" square	G1A102	0 608 800 062			
			3/8" square with centering pin	G1C102	0 608 800 072			
		50	3/8" square	G2A152	0 608 800 064			
			3/8" square with centering pin	G2C152	0 608 800 073			

* Accuracy is limited if operating below the working range.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Tightening Spindles Size 3
Offset Output Drive
1.7 – 51 Nm



① Offset output drive

Code	VNS2B152	VNS2A152	VNS2C152
Order no.	0 608 800 630	0 608 800 629	0 608 800 631
Max. torque	35 Nm	55 Nm	55 Nm
Range of spring	50 mm	50 mm	50 mm
Reduction	1	1	1
Typ. efficiency	0.93	0.93	0.93
Length A	152 mm	152 mm	152 mm
Installation length	240 mm	240 mm	240 mm
Weight	1.2 kg	1.2 kg	1.2 kg

② Measurement transducer

Code	3DMC017	3DMC060
Order no.	0 608 820 112	0 608 820 113
Nominal torque	17 Nm	60 Nm
Reduction	1	1
Typ. efficiency	1	1
Installation length	118.6 mm	118.6 mm
Weight	1 kg	1 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 3AR adapter.
For measurement transducer cables, see page 100.

③ Redundant adapter

Code	3AR
Order no.	0 608 810 021
Reduction	1
Typ. efficiency	1
Installation length	57 mm
Weight	0.4 kg

When configuring with a redundant measurement transducer, the 3AR adapter connects both measurement transducers.

④ Adapter

Code	3A
Order no.	0 608 810 025
Reduction	1
Typ. efficiency	1
Installation length	30.5 mm
Weight	0.3 kg

When configuring without a measurement transducer, the 3A adapter connects the output drive and the planetary gearbox.

⑤ Planetary gearbox

Code	3GE27	3GE67
Order no.	0 608 720 053	0 608 720 039
Reduction	27	67.4
Typ. efficiency	0.9	0.85
Installation length	65.5 mm	81.5 mm
Weight	0.5 kg	0.5 kg

⑥ Transverse gearbox

Code	3ULG
Order no. 0 608 PE0 283	
Reduction	1
Typ. efficiency	0.9
Installation length	30.1 mm
Weight	0.5 kg

The 3ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑦ EC motor

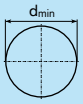
Code	EC303
Order no.	0 608 701 017
Installation length	219 mm
Weight	1.3 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth offset output drive

- For tight hole templates
- Standard tool mounts
- Easy assembly due to flange connection
- Maintenance-free for 1 million full load cycles

Side-by-side arrangement of tightening spindles (center-to-center distance)



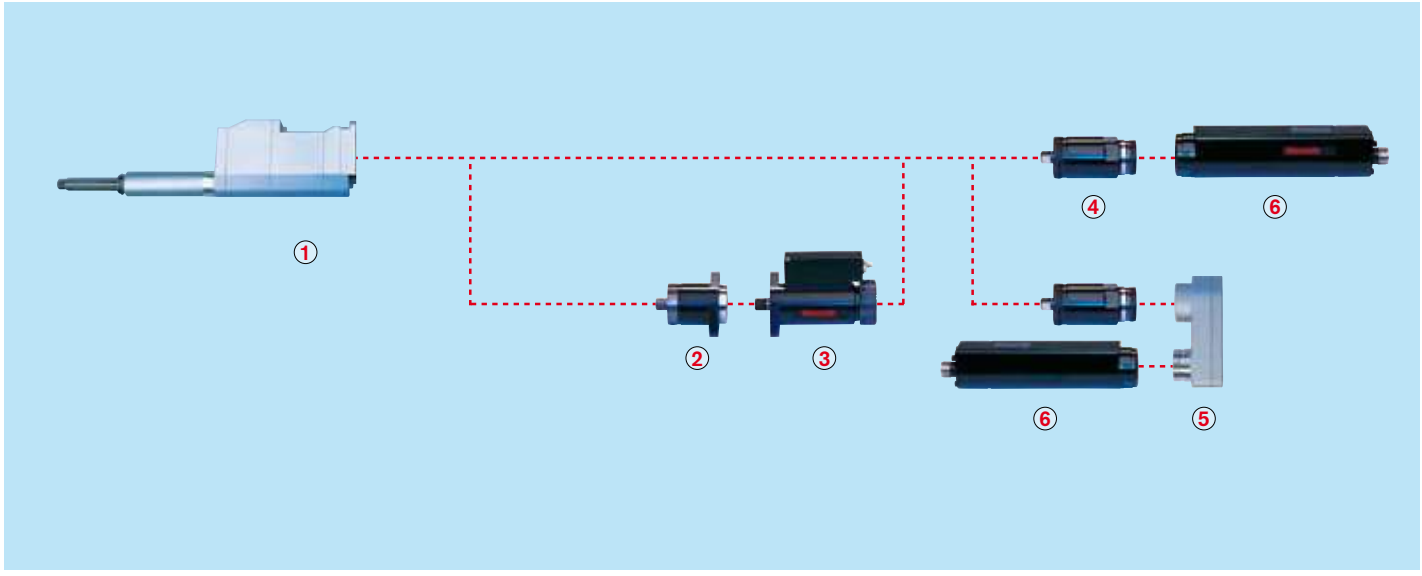
Number of tightening spindles	2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	29	33.5	41	49.5	58

Tightening spindle		Offset Output Drive				Measurement transducer	Planetary gearbox	EC motor
Working range* [Nm]	**Max. output drive speed** [1/min]	**Range of spring** [mm]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**	**Code / Order no.**
1.7–14.5	740	50	3/8" square	VNS2A152	0 608 800 629	3DMC017 0 608 820 112	3GE27 0 608 720 053	EC303 0 608 701 017
			1/4" quick-change chuck	VNS2B152	0 608 800 630			
			3/8" square with centering pin	VNS2C152	0 608 800 631			
	295	50	3/8" square	VNS2A152	0 608 800 629		3GE67 0 608 720 039	
			1/4" quick-change chuck	VNS2B152	0 608 800 630			
			3/8" square with centering pin	VNS2C152	0 608 800 631			
6–29	740	50	3/8" square	VNS2A152	0 608 800 629	3DMC060 0 608 820 113	3GE27 0 608 720 053	
			1/4" quick-change chuck	VNS2B152	0 608 800 630			
			3/8" square with centering pin	VNS2C152	0 608 800 631			
6–35	295	50	1/4" quick-change chuck	VNS2B152	0 608 800 630		3GE67 0 608 720 039	
6–51	295	50	3/8" square	VNS2A152	0 608 800 629			
			3/8" square with centering pin	VNS2C152	0 608 800 631			

* Accuracy is limited if operating below the working range.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Tightening Spindles Size 3 Offset Output Drive with Integrated Measurement Transducer, 1.6 – 53 Nm



① **Offset output drive with integrated measurement transducer**

Code	3VMC017	3VMC035	3VMC060
Order no.	0608801009	0608801010	0608801011
Max. torque	17 Nm	35 Nm	60 Nm
Range of spring	50 mm	50 mm	50 mm
Reduction	1	1	1
Typ. efficiency	0.93	0.93	0.93
Length A	152 mm	152 mm	152 mm
Installation length	311 mm	311 mm	311 mm
Weight	3.4 kg	3.4 kg	3.4 kg
Nominal torque Measurement transducer	17 Nm	35 Nm	60 Nm

③ **Measurement transducer**

Code	3DMC017	3DMC060
Order no.	0608820112	0608820113
Nominal torque	17 Nm	60 Nm
Reduction	1	1
Typ. efficiency	1	1
Installation length	118.6 mm	118.6 mm
Weight	1 kg	1 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 3AR adapter.
For measurement transducer cables, see page 100.

② **Redundant adapter**

Code	3AR
Order no.	0608810021
Reduction	1
Typ. efficiency	1
Installation length	57 mm
Weight	0.4 kg

When configuring with a redundant measurement transducer, the 3AR adapter connects the output drive and the planetary gearbox.

④ **Planetary gearbox**

Code	3GE27	3GE67
Order no.	0608720053	0608720039
Reduction	27	67.4
Typ. efficiency	0.9	0.85
Installation length	65.5 mm	81.5 mm
Weight	0.5 kg	0.5 kg

⑤ **Transverse gearbox**

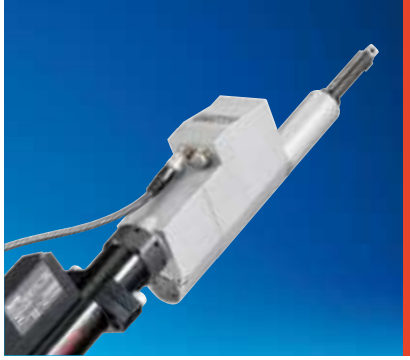
Code	3ULG
Order no.	0 608 PE0 283
Reduction	1
Typ. efficiency	0.9
Installation length	30.1 mm
Weight	0.5 kg

The 3ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑥ **EC motor**

Code	EC303
Order no.	0608701017
Installation length	219 mm
Weight	1.3 kg

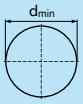
Depending on the size, the actual components may differ from those in the illustration.



Rexroth offset output drive with integrated measurement transducer

- Reduced center-to-center distances
- Torque measurement directly at the screw
- Proximity switching digital measurement transfer
- Efficiency fluctuations do not affect measurements

Side-by-side arrangement of tightening spindles (center-to-center distance)



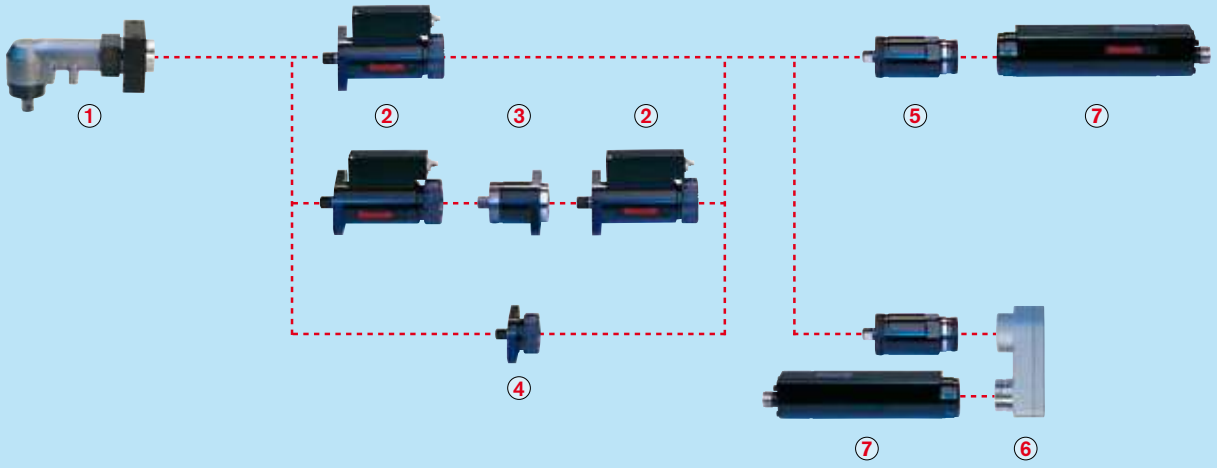
Number of tightening spindles	2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	31	36	44	53	62

Tightening spindle		Offset output drive with integrated measurement transducer				Planetary gearbox	EC motor
Working range* [Nm]	**Max. output drive speed** [1/min]	**Range of spring** [mm]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**
1.6–16	740	50	3/8" square	3VMC017	0 608 801 009	3GE27 060 8720 053	EC303 0 608 701 017
	295					3GE67 0 608 720 039	
6–29	740	50	3/8" square	3VMC035	0 608 801 010	3GE27 060 8720 053	
6–33	295	50	3/8" square	3VMC035	0 608 801 010	3GE67 0 608 720 039	
6–53	295	50	3/8" square	3VMC060	0 608 801 011		

* Accuracy is limited if operating below the working range.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Tightening Spindles Size 3
Angle head
1.7 – 90 Nm



① Angle head

Code	3W027	3W050	3W090
Order no.	0608810042	0608810043	0608810044
Max. torque	27 Nm	50 Nm	90 Nm
Reduction	1.05	1.05	1.67
Typ. efficiency	0.95	0.95	0.95
Installation length	85.6 mm	125.6 mm	125.6 mm
Weight	1 kg	1.4 kg	1.7 kg

② Measurement transducer

Code	3DMC017	3DMC060
Order no.	0 608 820 112	0 608 820 113
Nominal torque	17 Nm	60 Nm
Reduction	1	1
Typ. efficiency	1	1
Installation length	118.6 mm	118.6 mm
Weight	1 kg	1 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 3AR adapter.
For measurement transducer cables, see page 100.

③ Redundant adapter

Code	3AR
Order no.	0 608 810 021
Reduction	1
Typ. efficiency	1
Installation length	57 mm
Weight	0.4 kg

When configuring with a redundant measurement transducer, the 3AR adapter connects both measurement transducers.

④ Adapter

Code	3A
Order no.	0 608 810 025
Reduction	1
Typ. efficiency	1
Installation length	30.5 mm
Weight	0.3 kg

When configuring without a measurement transducer, the 3A adapter connects the output drive and the planetary gearbox.

⑤ Planetary gearbox

Code	3GE27	3GE67
Order no.	0 608 720 053	0 608 720 039
Reduction	27	67.4
Typ. efficiency	0.9	0.85
Installation length	65.5 mm	81.5 mm
Weight	0.5 kg	0.5 kg

⑥ Transverse gearbox

Code	3ULG
Order no.	0 608 PE0 283
Reduction	1
Typ. efficiency	0.9
Installation length	30.1 mm
Weight	0.5 kg

The 3ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑦ EC motor

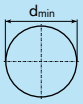
Code	EC303
Order no.	0 608 701 017
Installation length	219 mm
Weight	1.3 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth angle head

- For restricted accessibility
- Precision toothing for high torque accuracy
- Incremental positioning
- Integrated fastening flanges
- With integrated measurement transducer on request

Side-by-side arrangement of tightening spindles (center-to-center distance)



Number of tightening spindles		2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	3W027	29	34	41	50	58
	3W050	35	40	50	60	70
	3W090	45	52	64	78	90

Tightening spindle		Angle head			Measurement transducer	Planetary gearbox	EC motor
Working range * [Nm]	**Max. output drive speed** [1/min]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**	**Code / Order no.**
1.7–16	705	3/8" square	3W027	0 608 810 042	3DMC017 0 608 820 112	3GE27 0 608 720 053	EC303 0 608 701 017
	280					3GE67 0 608 720 039	
	705	3/8" square	3W050	0 608 810 043	3DMC017 0 608 820 112	3GE27 0 608 720 053	
	280					3GE67 0 608 720 039	
2.6–25	705	1/2" square	3W090	0 608 810 044	3DMC017 0 608 820 112	3GE27 0 608 720 053	
	280					3GE67 0 608 720 039	
6–27	705	3/8" square	3W027	0 608 810 042	3DMC060 0 608 820 113	3GE27 0 608 720 053	
	280					3GE67 0 608 720 039	
6–32	705	3/8" square	3W050	0 608 810 043	3DMC060 0 608 820 113	3GE27 0 608 720 053	
6–50	280					3GE67 0 608 720 039	
9–34	440	1/2" square	3W090	0 608 810 044	3DMC060 0 608 820 113	3GE27 0 608 720 053	
9–90	175					3GE67 0 608 720 039	

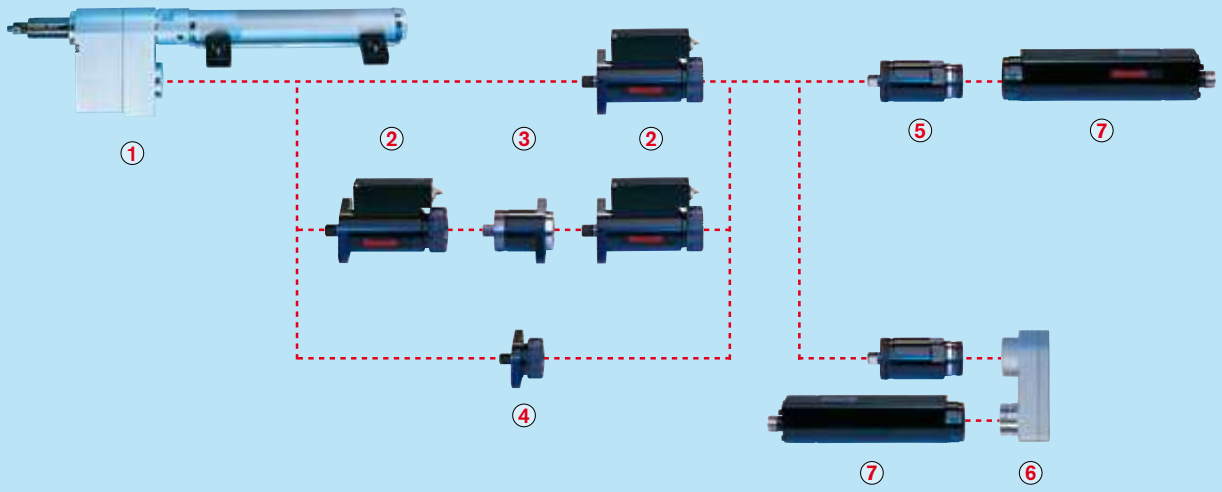
* Accuracy is limited if operating below the working range.

To ensure troublefree operation, the angle head must always be operated with an output drive axial compensator, e.g. spindle bearing. See page 27.

For an output drive axial compensator, the following angle head/spindle bearing combinations are possible:
3W027 (0 608 810 042) – spindle bearing size 3 (catalog page 30)
3W050 (0 608 810 043) – spindle bearing size 3 (catalog page 30)
3W090 (0 608 810 044) – spindle bearing size 4 (catalog page 40)

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Tightening Spindles Size 3
Feed Output Drive
1.7 – 53 Nm



① Feed output drive

Code	3S2	3S1
Order no.	0 608 800 611	0 608 800 610
Max. torque	20 Nm	55 Nm
Stroke	200 mm	200 mm
Max. air pressure	4 bar	4 bar
Reduction	1	1
Typ. efficiency	0.93	0.93
Length A	97 mm	97 mm
Installation length	204 mm	204 mm
Weight	3.5 kg	3.5 kg

② Measurement transducer

Code	3DMC017	3DMC060
Order no.	0 608 820 112	0 608 820 113
Nominal torque	17 Nm	60 Nm
Reduction	1	1
Typ. efficiency	1	1
Installation length	118.6 mm	118.6 mm
Weight	1 kg	1 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 3AR adapter.
For measurement transducer cables, see page 100.

③ Redundant adapter

Code	3AR
Order no.	0 608 810 021
Reduction	1
Typ. efficiency	1
Installation length	57 mm
Weight	0.4 kg

When configuring with a redundant measurement transducer, the 3AR adapter connects both measurement transducers.

④ Adapter

Code	3A
Order no.	0 608 810 025
Reduction	1
Typ. efficiency	1
Installation length	30.5 mm
Weight	0.3 kg

When configuring without a measurement transducer, the 3A adapter connects the output drive and the planetary gearbox.

⑤ Planetary gearbox

Code	3GE27	3GE67
Order no.	0608720053	0608720039
Reduction	27	67.4
Typ. efficiency	0.9	0.85
Installation length	65.5 mm	81.5 mm
Weight	0.5 kg	0.5 kg

⑥ Transverse gearbox

Code	3ULG
Order no.	0 608 PE0 283
Reduction	1
Typ. efficiency	0.9
Installation length	30.1 mm
Weight	0.5 kg

The 3ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑦ EC motor

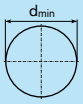
Code	EC303
Order no.	0 608 701 017
Installation length	219 mm
Weight	1.3 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth feed output drive

- Integrated feed movement
- In connection with automatic screw supply
- Standard tool mounts and compressed air connections
- Easy assembly due to flange connection
- Maintenance-free for 1 million full load cycles

Side-by-side arrangement of tightening spindles (center-to-center distance)



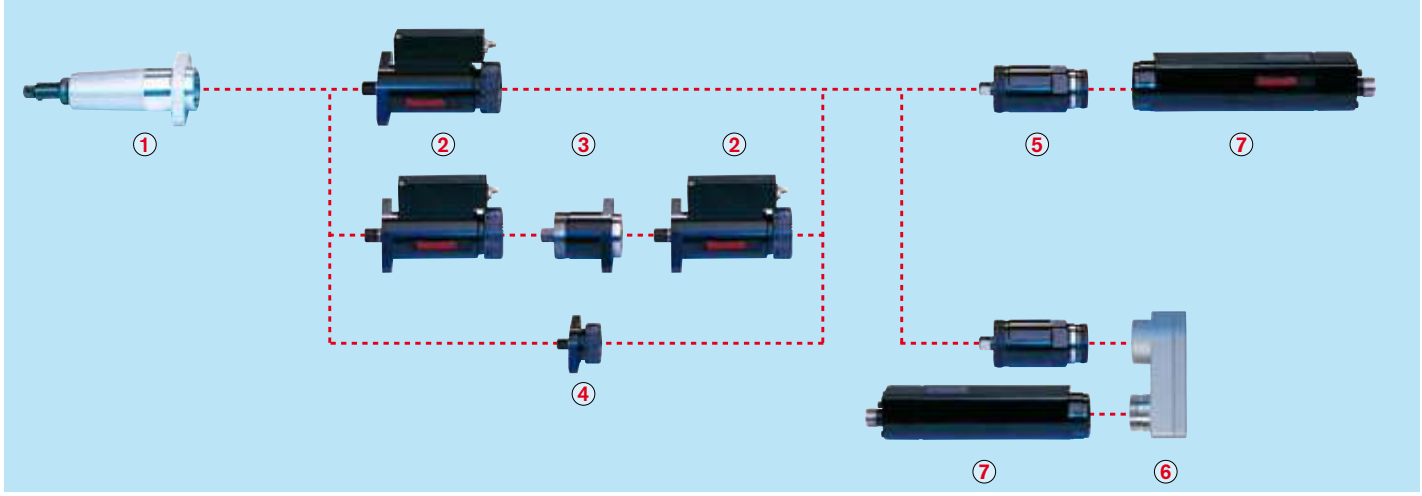
Number of tightening spindles	2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	49	56.5	69.5	83.5	98

Tightening spindle			Feed Output Drive			Measurement transducer	Planetary gearbox	EC motor
Working range* [Nm]	**Max. output drive speed** [1/min]	**Stroke** [mn]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**	**Code / Order no.**
1.7–15	740	200	3/8" square	3S1	0608800610	3DMC017 0608820112	3GE27 0608720053	EC303 0608701017
	295	200	3/8" square	3S1	0608800610		3GE67 0608720039	
	740	200	1/4" square	3S2	0608800611	3DMC017 0608820112	3GE27 0608720053	
	295	200	1/4" square	3S2	0608800611		3GE67 0608720039	
6–20	295	200	1/4" square	3S2	0608800611	3DMC060 0608820113	3GE67 0608720039	
6–20	740	200	1/4" square	3S2	0608800611		3GE27 0608720053	
6–30	740	200	3/8" square	3S1	0608800610	3DMC060 0608820113	3GE27 0608720053	
6–53	295	200	3/8" square	3S1	0608800610		3GE67 0608720039	

* Accuracy is limited if operating below the working range.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Tightening Spindles Size 4 Spindle Bearing 6 – 150 Nm



① Spindle bearing

Code	GK1…156	GK2…181	GK2…251	GL2…319
Order no. …A…	0 608 800 031	0 608 800 006	0 608 800 048	0 608 800 056
Order no. …B…	0 608 800 020	0 608 800 008	0 608 800 049	0 608 800 057
Order no. …C…	0 608 800 001	0 608 800 021	0 608 800 050	0 608 800 027
Max. torque	150 Nm	150 Nm	150 Nm	150 Nm
Range of spring	25 mm	50 mm	50 mm	50 mm
Reduction	1	1	1	1
Typ. efficiency	1	1	1	1
Length A	152 mm	181 mm	251 mm	319 mm
Installation length	170 mm	195mm	265 mm	333 mm
Weight	0.9 kg	1 kg	1 kg	2.1 kg

② Measurement transducer

Code	4DMC060	4DMC160
Order no.	0 608 820 114	0 608 820 115
Nominal torque	60 Nm	160 Nm
Reduction	1	1
Typ. efficiency	1	1
Installation length	122 mm	122 mm
Weight	1.6 kg	1.6 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 4AR adapter.
For measurement transducer cables, see page 100.

③ Redundant adapter

Code	4AR
Order no.	0 608 810 022
Reduction	1
Typ. efficiency	1
Installation length	65 mm
Weight	0.8 kg

When configuring with a redundant measurement transducer, the 4AR adapter connects both measurement transducers.

④ Adapter

Code	4A
Order no.	0 608 810 026
Reduction	1
Typ. efficiency	1
Installation length	26.5 mm
Weight	0.4 kg

When configuring without a measurement transducer, the 4A adapter connects the output drive and the planetary gearbox.

⑤ Planetary gearbox

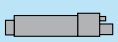
Code	4GE19	4GE59
Order no.	0 608 720 056	0 608 720 040
Reduction	19.3	58.6
Typ. efficiency	0.9	0.85
Installation length	82.9 mm	105.5 mm
Weight	0.7 kg	1.1 kg

⑥ Transverse gearbox

Code	4ULG
Order no.	0 608 PE0 024
Reduction	1
Typ. efficiency	0.9
Installation length	41.3 mm
Weight	1.4 kg

The 4ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑦ EC motor



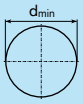
Code	EC304
Order no.	0 608 701 018
Installation length	247 mm
Weight	2.7 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth spindle bearing

- Various lengths with axial compensator
- Standard tool mounts
- Maximum efficiency
- Easy assembly due to flange connection
- Maintenance-free for 1 million full load cycles

Side-by-side arrangement of tightening spindles (center-to-center distance)



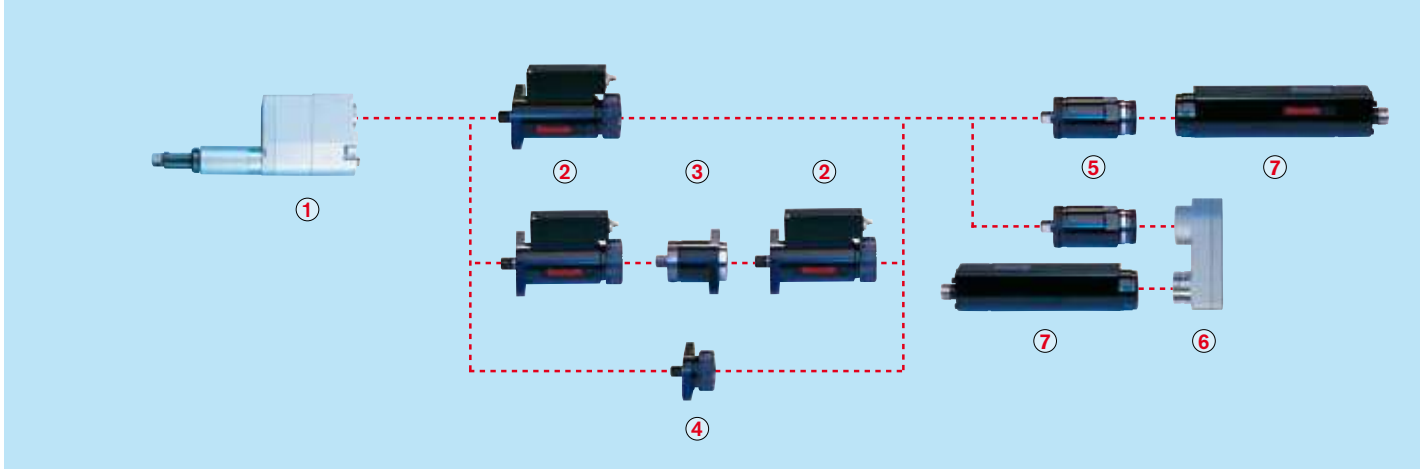
Number of tightening spindles	2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	59	69	89	109	119

Tightening spindle		Spindle Bearing				Measurement transducer	Planetary gearbox	EC motor
Working range* [Nm]	**Max. output drive speed** [1/min]	**Range of spring** [mm]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**	**Code / Order no.**
6–52	1000	25	1/2" square	GK1A156	0 608 800 031	4DMC060 0 608 820 114	4GE19 0 608 720 056	EC304 0 608 701 018
			7/16" quick-change chuck	GK1B156	0 608 800 020			
			1/2" square with centering pin	GK1C156	0 608 800 001			
		50	1/2" square	GK2A181/251	0 608 800 006 / 048			
			7/16" quick-change chuck	GK2B181/251	0 608 800 008 / 049			
			1/2" square with centering pin	GK2C181/251	0 608 800 021 / 050			
			1/2" square	GL2A319	0 608 800 056			
			7/16" quick-change chuck	GL2B319	0 608 800 057			
			1/2" square with centering pin	GL2C319	0 608 800 027			
6-56	340	25	1/2" square	GK1A156	0 608 800 031	4DMC060 0 608 820 114	4GE59 0 608 720 040	
			7/16" quick-change chuck	GK1B156	0 608 800 020			
			1/2" square with centering pin	GK1C156	0 608 800 001			
		50	1/2" square	GK2A181/251	0 608 800 006 / 048			
			7/16" quick-change chuck	GK2B181/251	0 608 800 008 / 049			
			1/2" square with centering pin	GK2C181/251	0 608 800 021 / 050			
			1/2" square	GL2A319	0 608 800 056			
			7/16" quick-change chuck	GL2B319	0 608 800 057			
			1/2" square with centering pin	GL2C319	0 608 800 027			
15–150	340	25	1/2" square	GK1A156	0 608 800 031	4DMC160 0 608 820 115		
			7/16" quick-change chuck	GK1B156	0 608 800 020			
			1/2" square with centering pin	GK1C156	0 608 800 001			
		50	1/2" square	GK2A181/251	0 608 800 006 / 048			
			7/16" quick-change chuck	GK2B181/251	0 608 800 008 / 049			
			1/2" square with centering pin	GK2C181/251	0 608 800 021 / 050			
			1/2" square	GL2A319	0 608 800 056			
			7/16" quick-change chuck	GL2B319	0 608 800 057			
			1/2" square with centering pin	GL2C319	0 608 800 027			

* Accuracy is limited if operating below the working range.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Tightening Spindles Size 4 Offset Output Drive 6 – 340 Nm



① **Offset output drive**

Code	VNK2…181	VNK2…251	VNL2…
Order no. …A…	0608800632	0608800633	0608800639
Order no. …B…	0608800634	0608800635	
Order no. …C…	0608800636	0608800637	0608800643
Max. torque	150 Nm	150 Nm	150 Nm
Range of spring	50 mm	50 mm	50 mm
Reduction	1	1	1
Typ. efficiency	0.91	0.91	0.91
Length A	182 mm	252 mm	320 mm
Installation length	309 mm	379 mm	448 mm
Weight	3.4 kg	4 kg	4.5 kg
Code	VUK2D242	VUK2D186	VUL2D290
Order no.	0608PE0588	0608800644	0608800645
Max. torque	200 Nm	340 Nm	340 Nm
Range of spring	50 mm	50 mm	50 mm
Reduction	1.46	2.56	2.56
Typ. efficiency	0.92	0.92	0.92
Length A	242 mm	186 mm	290 mm
Installation length	370 mm	354 mm	458 mm
Weight	5.8 kg	7.5 kg	8.5 kg

② **Measurement transducer**

Code	4DMC060	4DMC160
Order no.	0 608 820 114	0 608 820 115
Nominal torque	60 Nm	160 Nm
Reduction	1	1
Typ. efficiency	1	1
Installation length	122 mm	122 mm
Weight	1.6 kg	1.6 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 4AR adapter.
For measurement transducer cables, see page 100.

③ **Redundant adapter**

Code	4AR
Order no.	0 608 810 022
Reduction	1
Typ. efficiency	1
Installation length	65 mm
Weight	0.8 kg

When configuring with a redundant measurement transducer, the 4AR adapter connects both measurement transducers.

④ **Adapter**

Code	4A
Order no.	0 608 810 026
Reduction	1
Typ. efficiency	1
Installation length	26.5 mm
Weight	0.4 kg

When configuring without a measurement transducer, the 4A adapter connects the output drive and the planetary gearbox.

⑤ **Planetary gearbox**

Code	4GE19	4GE59
Order no.	0608720056	0608720040
Reduction	19.3	58.6
Typ. efficiency	0.9	0.85
Installation length	82.9 mm	105.5 mm
Weight	0.7 kg	1.1 kg

⑥ **Transverse gearbox**

Code	4ULG
Order no.	0 608 PE0 024
Reduction	1
Typ. efficiency	0.9
Installation length	41.3 mm
Weight	1.4 kg

The 4ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑦ **EC motor**

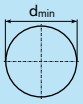
Code	EC304
Order no.	0 608 701 018
Installation length	247 mm
Weight	2.7 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth offset output drive

- For tight hole templates
- Standard tool mounts
- Easy assembly due to flange connection
- Maintenance-free for 1 million full load cycles

Side-by-side arrangement of tightening spindles (center-to-center distance)



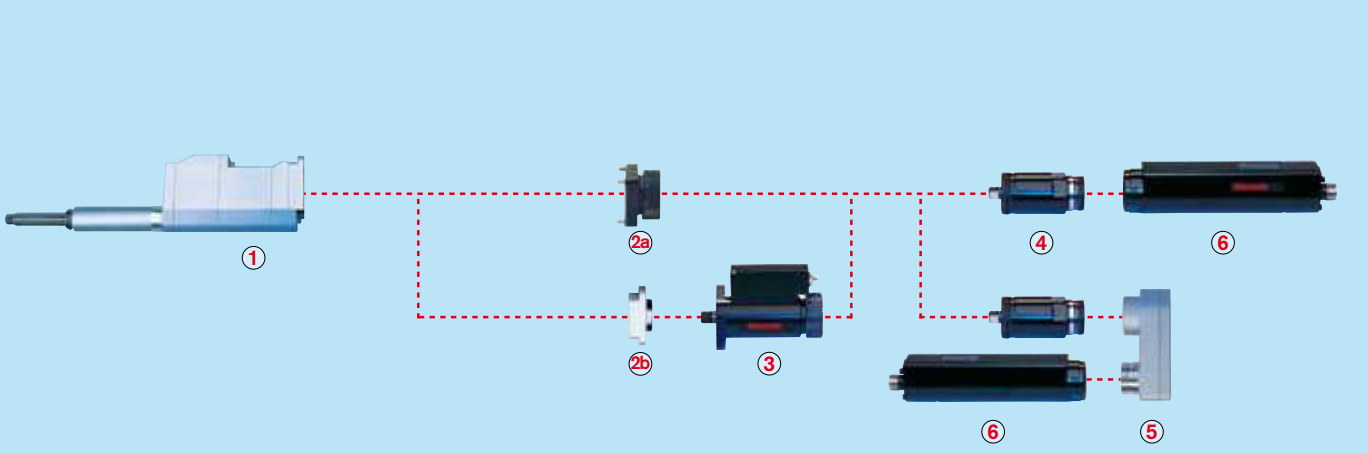
Number of tightening spindles		2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	VN…	44	51	63	75	88
	VU…	57	66	81	97	114
	VUK2D242	48	56	68	82	96

Tightening spindle		Offset Output Drive				Measurement transducer	Planetary gearbox	EC motor
Working range * [Nm]	**Max. output drive speed** [1/min]	**Range of spring** [mm]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**	**Code / Order no.**
6–51	1000	50	1/2" square	VNK2A181/251	0 608 800 632 / 633	4DMC060	4GE19	EC304
			7/16" change chuck	VNK2B181/251	0 608 800 634 / 635	0 608 820 114	0 608 720 056	0 608 701 018
			1/2" square with centering pin	VNK2C181/251	0 608 800 636 / 637			
			1/2" square	VNL2A319	0 608 800 639			
			1/2" square with centering pin	VNL2C319	0 608 800 643			
	340	50	1/2" square	VNK2A181/251	0 608 800 632 / 633		4GE59	
			7/16" change chuck	VNK2B181/251	0 608 800 634 / 635		0 608 720 040	
			1/2" square with centering pin	VNK2C181/251	0 608 800 636 / 637			
			1/2" square	VNL2A319	0 608 800 639			
			1/2" square with centering pin	VNL2C319	0 608 800 643			
8–75	740	50	3/4" square	VUK2D242	0 608 PE0 588	4DMC060	4GE19	
						0 608 820 114	0 608 720 056	
	240	50	3/4" square	VUK2D242	0 608 PE0 588		4GE59	
							0 608 720 040	
13–120	410	50	3/4" square	VUK2D186	0 608 800 644	4DMC060	4GE19	
				VUL2D290	0 608 800 645	0 608 820 114	0 608 720 056	
13–130	135	50	3/4" square	VUK2D186	0 608 800 644		4GE59	
				VUL2D290	0 608 800 645		0 608 720 040	
15–145	340	50	1/2" square	VNK2A181/251	0 608 800 632 / 633	4DMC160	4GE59	
			7/16" quick-change chuck	VNK2B181/251	0 608 800 634 / 635	0 608 820 115	0 608 720 040	
			1/2" square with centering pin	VNK2C181/251	0 608 800 636 / 637			
			1/2" square	VNL2A319	0 608 800 639			
			1/2" square with centering pin	VNL2C319	0 608 800 643			
20–200	240	50	3/4" square	VUK2D242	0 608 PE0 588	4DMC160	4GE59	
						0 608 820 115	0 608 720 040	
35–340	135	50	3/4" square	VUK2D186	0 608 800 644			
				VUL2D290	0 608 800 645	4DMC160	4GE59	
						0 608 820 115	0 608 720 040	

* Accuracy is limited if operating below the working range.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Tightening Spindles Size 4 Offset Output Drive with Integrated Measurement Transducer, 30 – 342 Nm



① Offset output drive with integrated measurement transducer

Code	4VMC150	4VMC210	4VMC360
Order no.	0608801 004	0608801 005	0608801 006
Max. torque	150 Nm	210 Nm	360 Nm
Range of spring	80 mm	80 mm	80 mm
Reduction	1	1.46	2.56
Typ. efficiency	0.92	0.92	0.92
Length A	242 mm	252 mm	246 mm
Installation length	438 mm	438 mm	476 mm
Weight	4.9 kg	7.1 kg	11.7 kg
Nominal torque Measurement transducer	150 Nm	210 Nm	360 Nm

②a AVG adapter

Code	4AVG
Order no.	0 608 801 008
Reduction	1
Typ. efficiency	1
Installation length	26.5 mm
Weight	0.4 kg

The 4AVG adapter connects the output drive and the planetary gearbox.

②b AVR redundant adapter

Code	4AVR
Order no.	0 608 801 007
Reduction	1
Typ. efficiency	1
Installation length	30.3 mm
Weight	0.7 kg

When configuring an offset output drive with integrated measurement transducer and redundant measurement transducer, the 4AR adapter connects both components.

③ Measurement transducer

Code	4DMC060	4DMC160
Order no.	0 608 820 114	0 608 820 115
Nominal torque	60 Nm	160 Nm
Reduction	1	1
Typ. efficiency	1	1
Installation length 122 mm		122 mm
Weight	1.6 kg	1.6 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 4AR adapter. For measurement transducer cables, see page 100.

④ Planetary gearbox

Code	4GE19	4GE59
Order no.	0 608 720 056	0 608 720 040
Reduction	19.3	58.6
Typ. efficiency	0.9	0.85
Installation length	82.9 mm	105.5 mm
Weight	0.7 kg	1.1 kg

⑤ Transverse gearbox

Code	4ULG
Order no.	0 608 PE0 024
Reduction	1
Typ. efficiency	0.9
Installation length	41.3 mm
Weight	1.4 kg

The 4ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑥ EC motor

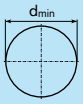
Code	EC304
Order no.	0 608 701 018
Installation length	247 mm
Weight	2.7 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth offset output drive with integrated measurement transducer

- Reduced center-to-center distances
- Torque measurement directly at the screw
- Proximity switching digital measurement transfer
- Efficiency fluctuations do not affect measurements

Side-by-side arrangement of tightening spindles (center-to-center distance)



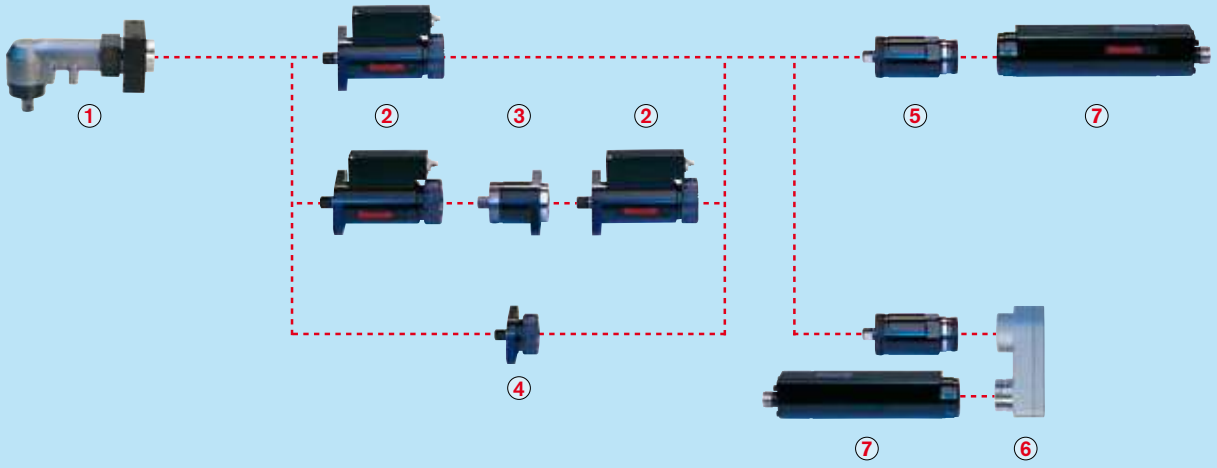
Number of tightening spindles		2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	4VMC150	44	51	63	75	88
	4VMC210	48	56	68	82	96
	4VMC360	57	66	81	97	114

Tightening spindle		Offset output drive with integrated measurement transducer				Planetary gearbox	EC motor
Working range* [Nm]	**Max. output drive speed** [1/min]	**Range of spring** [mm]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**
15–47	1000	80	1/2" square	4VMC150	0 608 801 004	4GE19	EC304
21–65	700	80	3/4" square	4VMC210	0 608 801 005	0 608 720 056	0 608 701 018
36–117	410	80	3/4" square	4VMC360	0 608 801 006		
15–142	340	80	1/2" square	4VMC150	0 608 801 004	4GE59	
21–200	240	80	3/4" square	4VMC210	0 608 801 005	0 608 720 040	
36–342	135	80	3/4" square	4VMC360	0 608 801 006		

* Accuracy is limited if operating below the working range.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Tightening Spindles Size 4
Angle head
6 – 220 Nm



① **Angle head**

Code	4W130	4W220
Order no.	0 608 810 045	0 608 810 046
Max. torque	130 Nm	220 Nm
Reduction	1.05	1.67
Typ. efficiency	0.95	0.95
Installation length	141.5 mm	141.5 mm
Weight	2.8 kg	3.2 kg

② **Measurement transducer**

Code	4DMC060	4DMC160
Order no.	0 608 820 114	0 608 820 115
Nominal torque	60 Nm	160 Nm
Reduction	1	1
Typ. efficiency	1	1
Installation length	122 mm	122 mm
Weight	1.6 kg	1.6 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 4AR adapter.
For measurement transducer cables, see page 100.

③ **Redundant adapter**

Code	4AR
Order no.	0 608 810 022
Reduction	1
Typ. efficiency	1
Installation length	65 mm
Weight	0.8 kg

When configuring with a redundant measurement transducer, the 4AR adapter connects both measurement transducers.

④ **Adapter**

Code	4A
Order no.	0 608 810 026
Reduction	1
Typ. efficiency	1
Installation length	26.5 mm
Weight	0.4 kg

When configuring without a measurement transducer, the 4A adapter connects the output drive and the planetary gearbox.

⑤ **Planetary gearbox**

Code	4GE19	4GE59
Order no.	0608720056	0608720040
Reduction	19.3	58.6
Typ. efficiency	0.9	0.85
Installation length	82.9 mm	105.5 mm
Weight	0.7 kg	1.1 kg

⑥ **Transverse gearbox**

Code	4ULG
Order no.	0 608 PE0 024
Reduction	1
Typ. efficiency	0.9
Installation length	41.3 mm
Weight	1.4 kg

The 4ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑦ **EC motor**

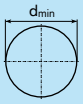
Code	EC304
Order no.	0 608 701 018
Installation length	247 mm
Weight	2.7 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth angle head

- For restricted accessibility
- Precision toothing for high torque accuracy
- Incremental positioning
- Integrated fastening flanges
- With integrated measurement transducer on request

Side-by-side arrangement of tightening spindles (center-to-center distance)



Number of tightening spindles		2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	4W130	47	55	67	80	94
	4W220	62	72	88	106	124

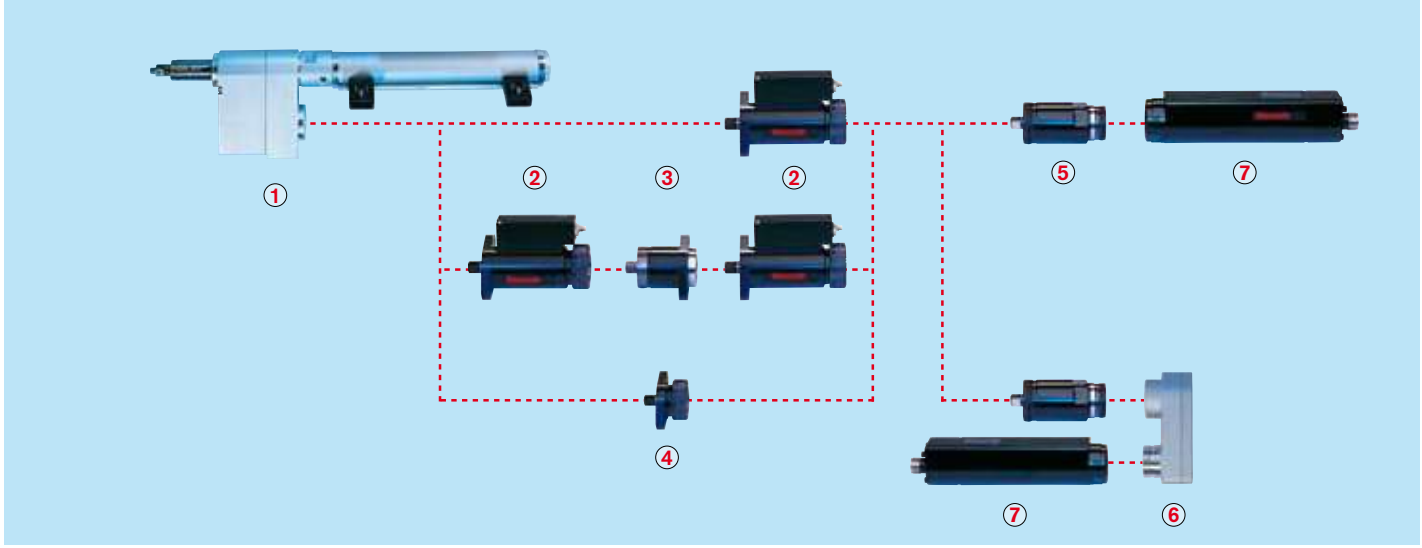
Tightening spindle		Angle head			Measurement transducer	Planetary gearbox	EC motor
Working range * [Nm]	**Max. output drive speed** [1/min]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**	**Code / Order no.**
6–52	985	1/2" square	4W130	0 608 810 045	4DMC060 0 608 820 114	4GE19 0 608 720 056	EC304 0 607 701 018
6–56	320	1/2" square	4W130	0 608 810 045		4GE59 0 608 720 040	
9–83	620	3/4" square	4W220	0 608 810 046		4GE19 0 608 720 056	
9–90	204	3/4" square	4W220	0 608 810 046		4GE59 0 608 720 040	
15–130	320	1/2" square	4W130	0 608 810 045	4DMC160 0 608 820 115	4GE59 0 608 720 040	
24–220	200	3/4" square	4W220	0 608 810 046			

* Accuracy is limited if operating below the working range.

To ensure troublefree operation, the angle head must always be operated with an output drive axial compensator e.g. spindle bearing. See page 27.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Tightening Spindles Size 4
Feed Output Drive
6 – 136 Nm



① Feed output drive

Code	4S1
Order no.	0 608 800 609
Max. torque	150 Nm
Stroke	200 mm
Max. air pressure	4 bar
Reduction	1
Typ. efficiency	0.9
Length A	101 mm
Installation length	219 mm
Weight	6.6 kg

② Measurement transducer

Code	4DMC060	4DMC160
Order no.	0 608 820 114	0 608 820 115
Nominal torque	60 Nm	160 Nm
Reduction	1	1
Typ. efficiency	1	1
Installation length	122 mm	122 mm
Weight	1.6 kg	1.6 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 4AR adapter.
For measurement transducer cables, see page 100.

③ Redundant adapter

Code	4AR
Order no.	0 608 810 022
Reduction	1
Typ. efficiency	1
Installation length	65 mm
Weight	0.8 kg

When configuring with a redundant measurement transducer, the 4AR adapter connects both measurement transducers.

④ Adapter

Code	4A
Order no.	0 608 810 026
Reduction	1
Typ. efficiency	1
Installation length	26.5 mm
Weight	0.4 kg

When configuring without a measurement transducer, the 4A adapter connects the output drive and the planetary gearbox.

⑤ Planetary gearbox

Code	4GE19	4GE59
Order no.	0 608 720 056	0 608 720 040
Reduction	19.3	58.6
Typ. efficiency	0.9	0.85
Installation length	82.9 mm	105.5 mm
Weight	0.7 kg	1.1 kg

⑥ Transverse gearbox

Code	4ULG
Order no.	0 608 PE0 024
Reduction	1
Typ. efficiency	0.9
Installation length	41.3 mm
Weight	1.4 kg

The 4ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑦ EC motor

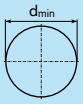
Code	EC304
Order no.	0 608 701 018
Installation length	247 mm
Weight	2.7 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth feed output drive

- Integrated feed movement
- In connection with automatic screw supply
- Standard tool mounts and compressed air connections
- Easy assembly due to flange connection
- Maintenance-free for 1 million full load cycles

Side-by-side arrangement of tightening spindles (center-to-center distance)



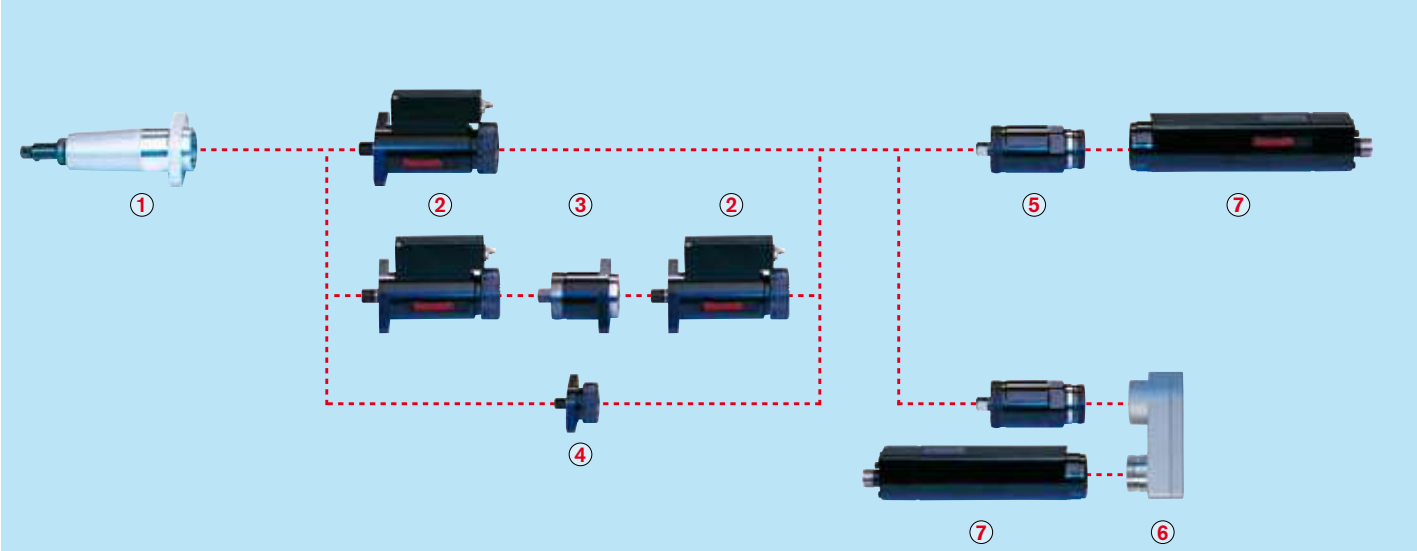
Number of tightening spindles	2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	56	65	79	95	112

Tightening spindle			Feed Output Drive			Measurement transducer	Planetary gearbox	EC motor
Working range * [Nm]	**Max. output drive speed** [1/min]	**Stroke** [mm]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**	**Code / Order no.**
6–47	1000	200	1/2" square with centering pin	4S1	0 608 800 609	4DMC060 0 608 820 114	4GE19 0 608 720 056	EC304 0 607 701 018
6–51	340	200	1/2" square with centering pin	4S1	0 608 800 609	4DMC060 0 608 820 114	4GE59 0 608 720 040	
15–136	340	200	1/2" square with centering pin	4S1	0 608 800 609	4DMC160 0 608 820 115	4GE59 0 608 720 040	

* Accuracy is limited if operating below the working range.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Tightening Spindles Size 5
Spindle Bearing
50 – 500 Nm



① 'A' Spindle bearing

Code	GK3C281	GK3C350	GL3C418
Order no.	0608800079	0608800081	0608800084
Max. torque	500 Nm	500 Nm	500 Nm
Range of spring	80 mm	80 mm	80 mm
Reduction	1	1	1
Typ. efficiency	1	1	1
Length A	284 mm	353 mm	421 mm
Installation length	302 mm	371 mm	439 mm
Weight	3 kg	3.5 kg	4.5 kg

② Measurement transducer

Code	5DMC530
Order no.	0 608 820 116
Nominal torque	530 Nm
Reduction	1
Typ. efficiency	1
Installation length	125.5 mm
Weight	3.7 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 5AR adapter.
For measurement transducer cables, see page 100.

③ Redundant adapter

Code	5AR
Order no.	0 608 810 023
Reduction	1
Typ. efficiency	1
Installation length	108 mm
Weight	2.4 kg

When configuring with a redundant measurement transducer, the 5AR adapter connects both measurement transducers.

④ Adapter

Code	5A
Order no.	0 608 810 027
Reduction	1
Typ. efficiency	1
Installation length	48.5 mm
Weight	2.2 kg

When configuring without a measurement transducer, the 5A adapter connects the output drive and the planetary gearbox.

⑤ Planetary gearbox

Code	5GE19	5GE68
Order no.	0608720058	0608720041
Reduction	19.3	67.9
Typ. efficiency	0.93	0.9
Installation length	154 mm	188 mm
Weight	2.9 kg	3.7 kg

⑥ Transverse gearbox

Code	5ULG
Order no.	0 608 PE0 023
Reduction	1
Typ. efficiency	0.9
Installation length	63.8 mm
Weight	3.2 kg

The 5ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑦ EC motor

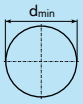
Code	EC305
Order no.	0 608 701 019
Installation length	304 mm
Weight	6.4 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth spindle bearing

- Various lengths with axial compensator
- Standard tool mounts
- Maximum efficiency
- Easy assembly due to flange connection
- Maintenance-free for 1 million full load cycles

Side-by-side arrangement of tightening spindles (center-to-center distance)



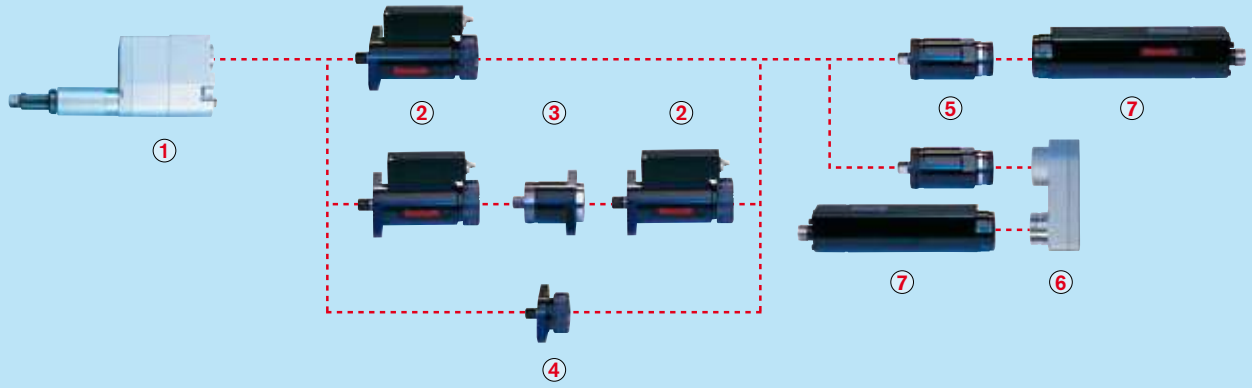
Number of tightening spindles	2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	86	100	131	162	172

Tightening spindle		Spindle bearing straight output drive				Measurement transducer	Planetary gearbox	EC motor
Working range * [Nm]	**Max. output drive speed** [1/min]	**Range of spring** [mm]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**	**Code / Order no.**
50-150	515	80	3/4" square with centering pin	GK3C281	0 608 800 079	5DMC530	5GE19	EC305
				GK3C350	0 608 800 081	0 608 820 116	0 608 720 058	0 608 701 019
				GL3C418	0 608 800 084			
50-500	145	80	3/4" square with centering pin	GK3C281	0 608 800 079	5DMC530	5GE68	
				GK3C350	0 608 800 081	0 608 820 116	0 608 720 041	
				GL3C418	0 608 800 084			

* Accuracy is limited if operating below the working range.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Tightening Spindles Size 5 Offset Output Drive 50 – 1000 Nm



① Offset output drive

Code	VNK3C281	VNK3C350	VNL3C418
Order no.	0 608 800 543	0 608 800 545	608 800 548
Max. torque	500 Nm	500 Nm	500 Nm
Range of spring	80 mm	80 mm	80 mm
Reduction	1	1	1
Typ. efficiency	0.92	0.92	0.92
Length A	284 mm	353 mm	421 mm
Installation length	482 mm	551 mm	619 mm
Weight	11.7 kg	11.7 kg	12.9 kg

Code	VUK3D316	VUK3D384
Order no.	0 608 PE0 017	0 608 PE0 180
Max. torque	1000 Nm	1000 Nm
Range of spring	80 mm	80 mm
Reduction	2.51	2.51
Typ. efficiency	0,9	0,9
Length A	320 mm	388 mm mm
Installation length	572 mm	640 mm
Weight	30 kg	32 kg

② Measurement transducer

Code	5DMC530
Order no.	0 608 820 116
Nominal torque	530 Nm
Reduction	1
Typ. efficiency	1
Installation length	125.5 mm
Weight	3.7 kg

You can configure your tightening spindle with a redundant measurement transducer from the same type.
Connect both measurement transducers with the 5AR adapter.
For measurement transducer cables, see page 100.

③ Redundant adapter

Code	5AR
Order no.	0 608 810 023
Reduction	1
Typ. efficiency	1
Installation length	108 mm
Weight	2.4 kg

When configuring with a redundant measurement transducer, the 5AR adapter connects both measurement transducers.

④ Adapter

Code	5A
Order no.	0 608 810 027
Reduction	1
Typ. efficiency	1
Installation length	48.5 mm
Weight	2.2 kg

When configuring without a measurement transducer, the 5A adapter connects the output drive and the planetary gearbox.

⑤ Planetary gearbox

Code	5GE19	5GE68
Order no.	0 608 720 058	0 608 720 041
Reduction	19,3	67,9
Typ. efficiency	0.93	0.9
Installation length	154 mm	188 mm
Weight	2.9 kg	3.7 kg

⑥ Transverse gearbox

Code	5ULG
Order no.	0 608 PE0 023
Reduction	1
Typ. efficiency	0.9
Installation length	63.8 mm
Weight	3.2 kg

The 5ULG transverse gearbox shortens the length of your tightening spindle by the installation length of the EC motor plus the installation length of the transverse gearbox. The use of a transverse gearbox decreases the tightening spindle working area.

⑦ EC motor

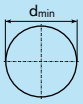
Code	EC305
Order no.	0 608 701 019
Installation length	304 mm
Weight	6.4 kg

Depending on the size, the actual components may differ from those in the illustration.

Rexroth offset output drive

- For tight hole templates
- Standard tool mounts
- Easy assembly due to flange connection
- Maintenance-free for 1 million full load cycles

Side-by-side arrangement of tightening spindles (center-to-center distance)



Number of tightening spindles		2	3	4	5	6
Smallest circle diameter Ø d_{min} [mm]	VN…	61	71	87	104	122
	VU…	94	108	133	159	187

Tightening spindle		Offset Output Drive				Measurement transducer	Planetary gearbox	EC motor
Working range * [Nm]	**Max. output drive speed** [1/min]	**Range of spring** [mm]	**Tool mount**	**Code**	**Order no.**	**Code / Order no.**	**Code / Order no.**	**Code / Order no.**
50-135	515	80	3/4" square with centering pin	VNK3C281	0 608 800 543	5DMC530	5GE19	EC305
				VNK3C350	0 608 800 545	0 608 820 116	0 608 720 058	0 608 701 019
				VNL3C418	0 608 800 548			
115-335	200	80	1" square with centering pin	VUK3D316	0 608 PE0 017			
				VUK3D384	0 608 PE0 180			
50-465	145	80	3/4" square with centering pin	VNK3C281	0 608 800 543	5DMC530	5GE68	
				VNK3C350	0 608 800 545	0 608 820 116	0 608 720 041	
				VNL3C418	0 608 800 548			
115-1000	55	80	1" square with centering pin	VUK3D316	0 608 PE0 017			
				VUK3D384	0 608 PE0 180			

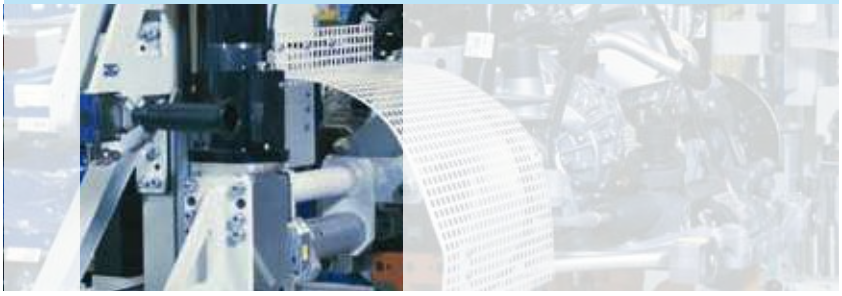
* Accuracy is limited if operating below the working range.

Note: You can find component dimensions and 3D/CAD data on the Internet at www.boschrexroth.com/schraubtechnik

Accessories for Tightening Spindles

Angle heads for size 5 tightening spindles

On request



Angle heads with counter bracket

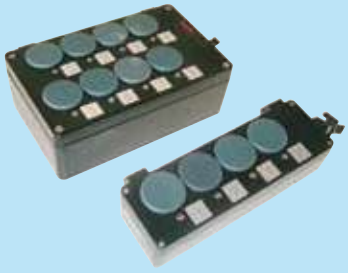
On request

Supports

On request

Block output drives

On request



Socket tray

On request

Feed gripper

On request

Note: For other application options and held-held tightening systems, see "Customized Solutions" from page 110.

Trustworthy:
The ErgoSpin Hand-Held Nutrunner

Millions of drivers
put their trust in hand-held nutrunners from Rexroth every single day. Take the steering wheel as an example: its stability is guaranteed by bolts tightened securely by the ErgoSpin. Thanks to its compact and ergonomic design, it is the perfect tool for industrial environment. Digital data transfer ensures process reliability for tightening results and complete documentation. Secure your processes with the ErgoSpin hand-held nutrunner!

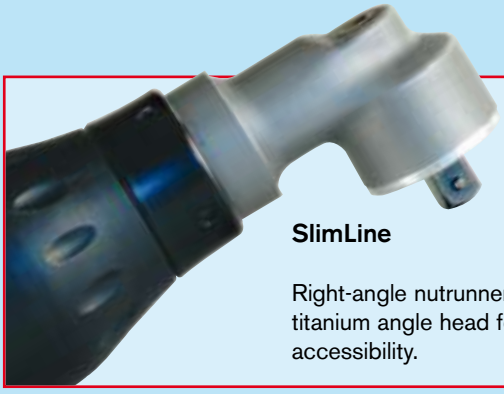
HIgh quality, high availability
ErgoSpin hand-held nutrunners are tested in endurance tests of more than a million tightenings under full load – without maintenance.

Ergonomic, Powerful, Handy

ErgoSpin – designed for your hands

The ErgoSpin is designed according to the latest findings in ergonomics and fits the user's hand like a glove. The ergonomics of the handle, its light weight, and the optimum arrangement of operating and display units increase worker productivity. In the GripLine and SlimLine models, the titanium angle head has a non-interchangeable code and can be adjusted and locked in 15-degree steps. The ErgoSpin allows the user fatigue-free work in any position.

Similar to the right-angle nutrunner from the ErgoSpin family, the pistolgrip nutrunner can also be easily connected and integrated into the Rexroth tightening system with Plug and Run.



SlimLine

Right-angle nutrunner with slim titanium angle head for high accessibility.

GripLine

Right-angle nutrunner with plastic-covered titanium angle head for protection against scratches and accidental contacts as well as a second grip

ESM

Pistolgrip nutrunner for hard-to-reach tightening positions with integrated powerful LED.

VarioLine

Zero-play spur gearing for free connection of crowfoot wrenches and special output drives

ErgoSpin ESM Pistolgrip Nutrunner

ErgoSpin ESM0…SD

Working range [Nm]	Max. output drive speed [1/min]	Tool mount	Weight [kg]	Installation length [mm]	Code	Order no.
2.4–12	1090	1/4" square	1	190	ESM012SD	0 608 841 042
5–25	1700	3/8" square	1.4	223	ESM025SD	0 608 841 044
7–35	1025	3/8" square	1.4	223	ESM035SD	0 608 841 046

ErgoSpin ESM012QD

Working range [Nm]	Max. output drive speed [1/min]	Tool mount	Weight [kg]	Installation length [mm]	Code	Order no.
2.4–12	1090	1/4" quick-change chuck	1	201	ESM012QD	0 608 841 043

ErgoSpin ESM025HT

Working range [Nm]	Max. output drive speed [1/min]	Tool mount	Weight [kg]	Installation length [mm]	Code	Order no.
5–25	1700	3/8" square and zero-play spur gearing for free connection of special output drives	1.4	223	ESM025HT	0 608 841 045

Note: For special output drives and planetary gearboxes suitable for the ErgoSpin, see "Accessories for ErgoSpin Hand-Held Nutrunners" from page 64 onwards.

ErgoSpin GripLine
ErgoSpin SlimLine
ErgoSpin VarioLine

ErgoSpin GripLine

Working range [Nm]	Max. output drive speed [1/min]	Tool mount	Weight [kg]	Installation length [mm]	Code	Order no.
1–5	1000	1/4" square	1.3	385	ESA005G	0 608 841 028
2.6–13	1000	1/4" square	1.3	385	ESA013G	0 608 841 029
6–30	800	3/8" square	1.6	423,5	ESA030G	0 608 841 030
8–40	1000	3/8" square	1.8	437	ESA040G	0 608 841 031
11–56	710	3/8" square	1.9	453	ESA056G	0 608 841 032
13–65	610	1/2" square	1.9	453	ESA065G	0 608 841 033
15–75	530	1/2" square	2.1	454	ESA075G	0 608 841 034

ErgoSpin SlimLine

Working range [Nm]	Max. output drive speed [1/min]	Tool mount	Weight [kg]	Installation length [mm]	Code	Order no.
1–5	1000	1/4" square	1.3	382	ESA005S	0 608 841 018
2.6–13	1000	1/4" square	1.3	382	ESA013S	0 608 841 019
6–30	800	3/8" square	1.6	416	ESA030S	0 608 841 020
8–40	1000	3/8" square	1.7	434	ESA040S	0 608 841 021
11–56	710	3/8" square	1.9	446	ESA056S	0 608 841 022
13–65	610	1/2" square	1.9	448	ESA065S	0 608 841 023
15–75	530	1/2" square	2	450	ESA075S	0 608 841 024
20–100	630	1/2" square	3.1	492	ESA100S	0 608 841 025
30–150	380	1/2" square	3.8	531	ESA150S	0 608 841 026
44–220	260	3/4" square	4	541	ESA220S	0 608 841 027

ErgoSpin VarioLine

Working range [Nm]	Max. output drive speed [1/min]	Tool mount	Weight [kg]	Installation length [mm]	Code	Order no.
1–5	1090	Standard machine without output drive and with zero-play spur gearing for free connection of crowfoot wrenches and special output drives	1.1	333	ESV005	0 608 841 041
2.4–12	1090		1.1	333	ESV012	0 608 841 035
5–25	1700		1.4	365	ESV025	0 608 841 037
10–50	830		1.5	375	ESV050	0 608 841 038
14–73	900		2.4	406	ESV073	0 608 841 039
29–146	420		2.8	430	ESV146	0 608 841 040

Output Drives for ErgoSpin VarioLine

Angle heads

You can mount different angle heads on the ErgoSpin VarioLine. This makes your ErgoSpin hand-held nutrunner suitable for a variety of applications.

With an angle head for special output drives, you can e.g. mount a crowfoot wrench to the VarioLine.

VarioLine combination options with angle heads

Angle head

Example illustration

ErgoSpin VarioLine Code	Code	Tool mount	Max. torque** [Nm]	Reduction	Avg. efficiency	Order no.
ESV005	WH013S	1/4" square	13	1.1	0,95	3 608 876 051
	WH013G*	1/4" square	13	1.1	0,95	3 608 876 052
ESV012	WH013S	1/4" square	13	1.1	0,95	3 608 876 051
	WH013G*	1/4" square	13	1.1	0,95	3 608 876 052
ESV025	WH040S	3/8" square	40	1,73	0,95	3 608 876 055
	WH040G*	3/8" square	40	1,73	0,95	3 608 876 056
ESV050	WH056S	3/8" square	56	1.16	0,95	3 608 876 057
	WH056G*	3/8" square	56	1.16	0,95	3 608 876 058
	WH065S	1/2" square	65	1.35	0,95	3 608 876 059
	WH065G*	1/2" square	65	1.35	0,95	3 608 876 060
	WH075S	1/2" square	75	1.56	0,95	3 608 876 061
	WH075G*	1/2" square	75	1.56	0,95	3 608 876 062
ESV073	WH100S	1/2" square	100	1.42	0,95	3 608 876 063
ESV146	WH150S	1/2" square	150	1.1	0,95	3 608 876 064
	WH220S	3/4" square	220	1.59	0,95	3 608 876 065

Angle head for special output drives

Example with crowfoot wrench

ErgoSpin VarioLine Code	Code	Tool mount	Max. torque** [Nm]	Reduction	Avg. efficiency	Order no.
ESV025	WHS040	3/8" square	40	1.73	0,95	3 608 876 081
ESV050	WHS075	1/2" square	75	1.56	0,95	3 608 876 082
ESV073	WHS100	1/2" square	100	1.42	0,95	3 608 876 083

* Plastic-covered titanium angle head as a second grip

** Value refers to angle head

VarioLine hand-held nutrunner becomes a tightening spindle

- Extended application options in combination with handling devices
- Can be used as a tightening spindle with output drive adapters
- Fully suitable for robot use

ESISA012 / ESIQA012

Straight output drives

Straight output drives combined with the ErgoSpin VarioLine produce a straight nutrunner. The combination of VarioLine and straight output drives always delivers an ergonomic solution for tightening cases of up to 12 Nm: whether vertically suspended, as a hand-held straight nutrunner, a hand-held application, or in connection with handling devices.

VarioLine combination options with straight output drives*

ErgoSpin VarioLine Code	Working range [Nm]	Tool mount	Reduction	Avg. efficiency	Installation length [mm]	Weight [kg]	Code	Order no.
ESV005	1 – 5	1/4" square	1	1	31.5	0.1	ESISA012	0 608 810 047
	1 – 5	1/4" quick-change chuck	1	1	31.5	0.1	ESIQA012	0 608 810 048
ESV012	2.4 – 12	1/4" square	1	1	31.5	0.1	ESISA012	0 608 810 047
	2.4 – 12	1/4" quick-change chuck	1	1	31.5	0.1	ESIQA012	0 608 810 048

ESOA…

Output drive adapters

With the output drive adapters, you can combine the ErgoSpin VarioLine with output drives in sizes 2, 3, and 4 for tightening spindles and e.g. use it as a tightening spindle.

VarioLine combination options with output drive adapters*

ErgoSpin VarioLine Code	Working range [Nm]	Tool mount	Reduction	Avg. efficiency	Installation length [mm]	Weight [kg]	Code	Order no.
ESV005	1 – 5	BG2	1	1	41.4	0.1	ESOA012	0 608 810 049
ESV012	2.4 – 12	BG2	1	1	41.4	0.1	ESOA012	0 608 810 049
ESV025	5 – 25	BG3	1	1	40.3	0.1	ESOA025	0 608 810 050
ESV050	10 – 50	BG3	1	1	41.2	0.2	ESOA050	0 608 810 051
ESV073	14 – 73	BG4	1	1	44.5	0.3	ESOA073	0 608 810 052
ESV146	29 – 146	BG4	1	1	44	0.3	ESOA146	0 608 810 053

* Special output drives on request

Accessories for ErgoSpin Hand-Held Nutrunners

Holder for right-angle nutrunner and straight nutrunner

Code	Order no.
ESAT	3 608 876 626

Holder for ESM pistolgrip nutrunner

Code	Order no.
ESMT	3 608 877 433

Turning suspension

Code	Ø [mm]	ErgoSpin	Order no.
ESMH1	50	ESA005-075 ESV005-050	3 608 875 426
ESMH2	63	ESA100-220 ESV073-146	3 608 875 921

Turning suspension for ErgoSpin with extension

	On request

Suspension for ErgoSpin pistolgrip **nutrunner**

Code	Order no.
ESMB	3 608 876 767

Extension

Code	Installation length [mm]	ErgoSpin	Order no.
ESET040	200	ESA040	3 608 877 798
ESET056	250	ESA056	3 608 877 799
ESET065	250	ESA065	3 608 877 800
ESET075	250	ESA075	3 608 877 801
ESET100	250	ESA100	3 608 877 802

Extra grip

Code	ErgoSpin	Order no.
ESMH12	ESM012SD, ESM012QD	3 608 877 111
ESMH12	ESM025SD, ESM025HT, ESM035SD	3 608 877 112

Vertical suspension

Code	ErgoSpin	Order no.
ESMV	ESA005-075 ESV005-050	3 608 875 435

Start lever extension for straight nutrunners incl. vertical suspension

Code	ErgoSpin	Order no.
ESTE	ESA005-075 ESV005-050	3 608 876 175

Stroke extension

Code	Order no.
ESSE	3 608 876 746

Adapter for handling devices from Bosch Rexroth

Adapter without drilling template

Code	ErgoSpin	Order no.
ESCU1B	ESA005-075 ESV005-050	3 608 876 459
ESCU2B	ESA100-220 ESV073-146	3 608 876 409
ESCU1F	ESA005-075 ESV005-050	3 608 876 751
ESCU2F	ESA100-220 ESV073-146	3 608 876 749

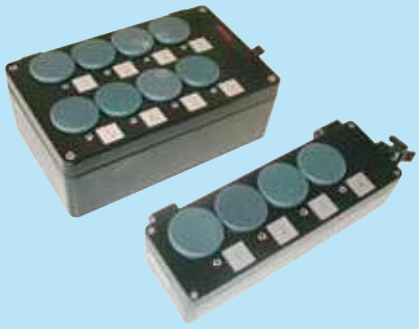
Mounting aid for angle heads

Code	Order no.
ESWM	3 608 876 473

Torque support

	On request

Socket tray



On request

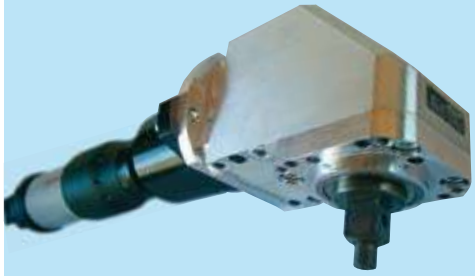
ErgoSpin with integrated scanner

On request

Planetary gearboxes for high torques up to 100, 340 and 600 Nm

On request

Angle head for torques above 220 Nm



On request

Powerful and Sturdy:
Control and power electronics

Powerful and sturdy – these adjectives perfectly describe the control and power electronics from Rexroth. The new hardware platform is based on cutting-edge technologies and thus ensures investment security. It has been specially developed for industrial applications. The system box and compact system fully comply with the IP54 protection class.

Both components also set new technical standards. The control variants integrated with flexibly programmable logic complies with IEC 61131-3 opens up additional automation options: Peripheral functions, as well as the tightening task, can be freely programmed.

Control and Power Electronics in the Tightening System

One nutrunner – multiple nutrunners?

1 Compact System or modular system

1 tightening channel = CS351 Compact System p. 72
2 to 40 tightening channels = 350 modular system p. 76

350 modular system – where to store the system components?

2 BT card rack or SB system box

The card rack is designed for installation in a control cabinet.
Tightening systems without control cabinets are possible with the system box.

Universal communication – the KE communication unit

3 Configuration of first BT card rack / first SB system box

VM power supply module
KE communication unit

SE control units	Max. 3 SE per BT / SB
LTS servo amplifiers (tightening spindles) / LTE (ErgoSpin)	Max. 5 LTS / LTE per BT / SB

1, 2, 3...and many more

4 Connecting multiple BT card racks / SB system boxes

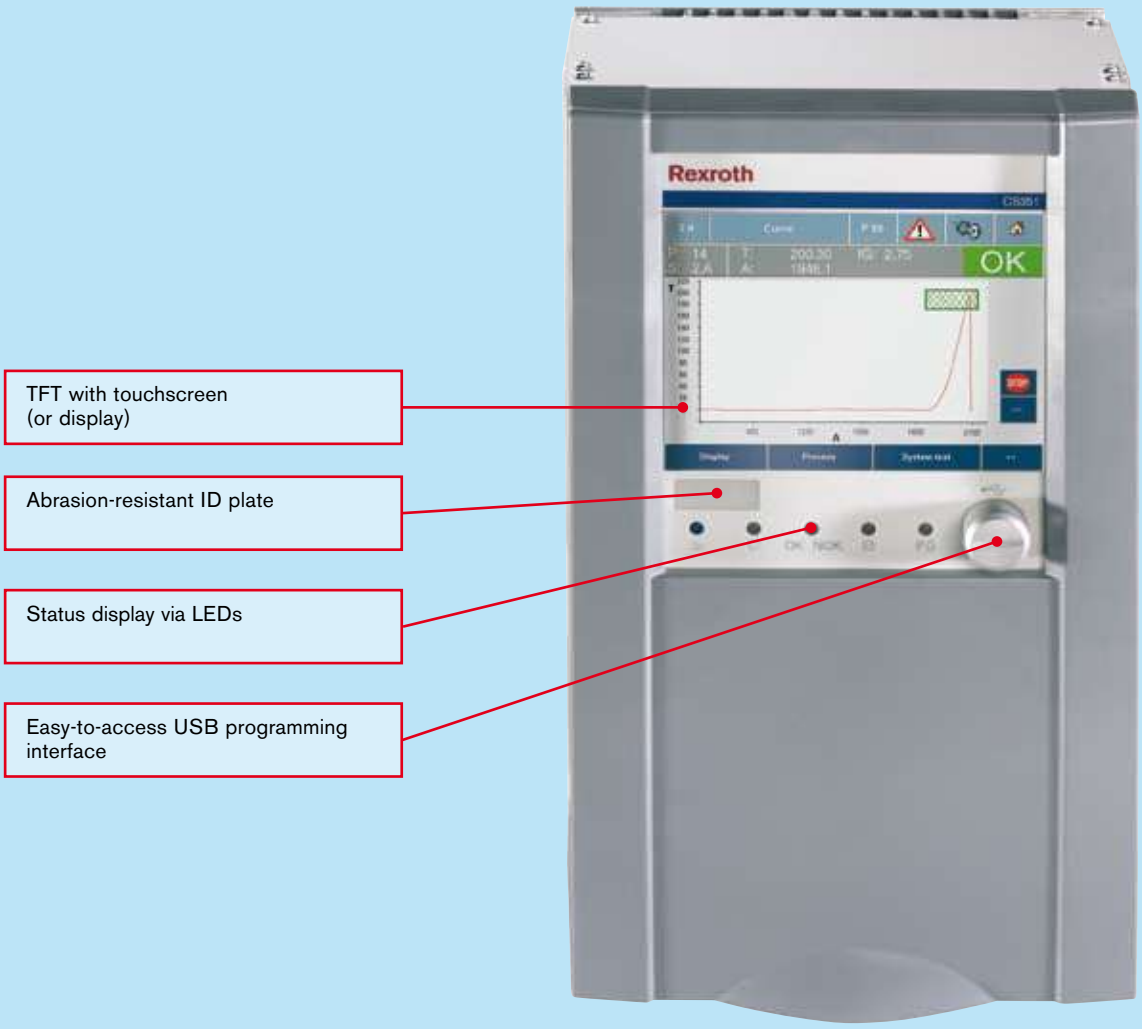
Multiple BT / SB are connected to NK network couplers.
No KE is required from the 2nd BT / SB upwards.
Another LTS / LTE can be inserted in its position.

Configuration from 2nd BT / SB:
Max. 3 SE per BT / SB
Max. 6 LTS / LTE per BT / SB

CS351 Compact System

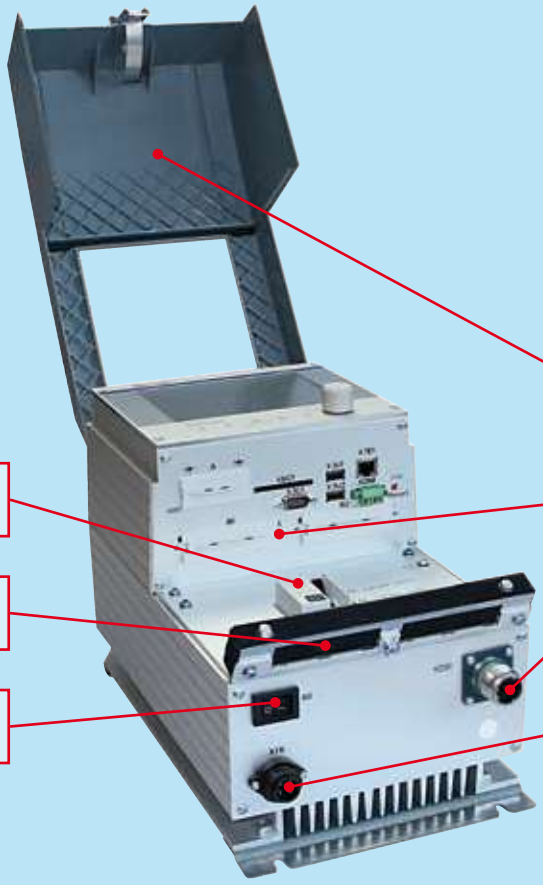
CS351 Compact System

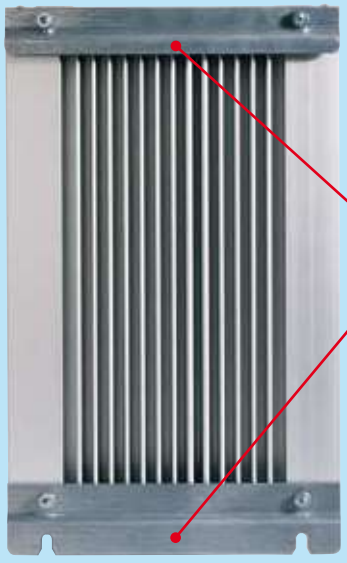
The operating and display units, as well as the connections, are arranged in a user-friendly, modern, and convincing design. The clear structure of the CS351 allows intuitive operation without any complicated configuration. The housing, which is no larger than a mini-tower, fully complies with protection class IP54. Its compact interior combines power electronics and Ethernet-based bus systems with the new high-performance 350 control generation.



Compact and powerful

- Secure and fast commissioning
- Tightening results at a glance
- Sturdy: IP54, EMC severity level IV
- USB and Ethernet-based bus systems

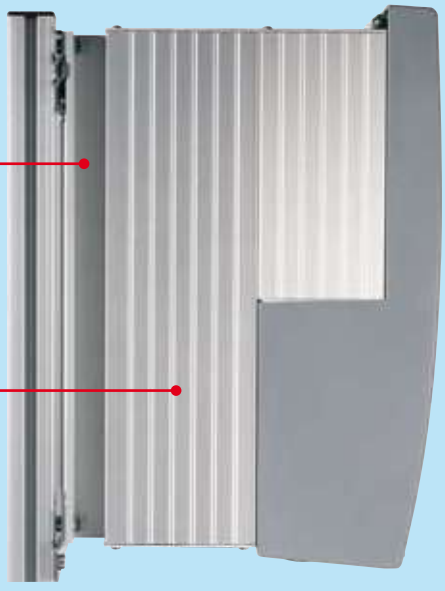




Cable duct

Suspension strip for easy assembly

High-quality aluminum housing



CS351 Compact System Model Variants

CS351…-G…Compact System
High-quality TFT with touchscreen and large viewing angle

- Resolution: 640 x 480
- Actual value display
- Tightening graph display
- Parameter changes
- Ethernet on board
- Tightening program selection

CS351…-D…Compact System
Display version with DVI interface

- Actual value display
- Connection to external DVI monitor and input unit
- Ethernet on board

CS351

- Dimensions (H x W x D): 358 x 210 x 253 mm
- Very easy suspension, even in tight areas
- Hinged, removable interface cover
- Highly flexible and future-proof due to interface modules
- IP54 protection class
- 120 V and 230 V power supply
- Mains connection cable 230 V included in scope of delivery
- Motor stop interface
- Residual-current-operated protective device (RCD)
- Connection cable can be exchanged without tools

CS351…IL

- Integrated logic
- Flexibly programmable according to IEC 61131-3
- Easy automation for the entire tightening task

CS351…NK

- Can be connected as an additional tightening channel to the KE350/ KE350G IL via the network coupler cable
- Complete system bus diagnosis
- Central data output via the KE350/ KE350G IL

Compact System for	Code	Weight [kg]	Order no.
ErgoSpin	CS351E-G	9.7	0608830258
	CS351E-D	9.5	0608830257
	CS351E-G IL	9.7	0608830275
	CS351E-D IL	9.5	0608830274
	CS351E-D NK	9.9	0608830281
Tightening spindle	CS351S-G	9.7	0608830255
	CS351S-D	9.5	0608830254
	CS351S-G IL	9.7	0608830277
	CS351S-D IL	9.5	0608830276
	CS351S-D NK	9.9	0608830282

Note: For cable selection, see "Rexroth cables" from page 96.

CS351 Compact System: ErgoSpin hand-held nutrunner or tightening spindle

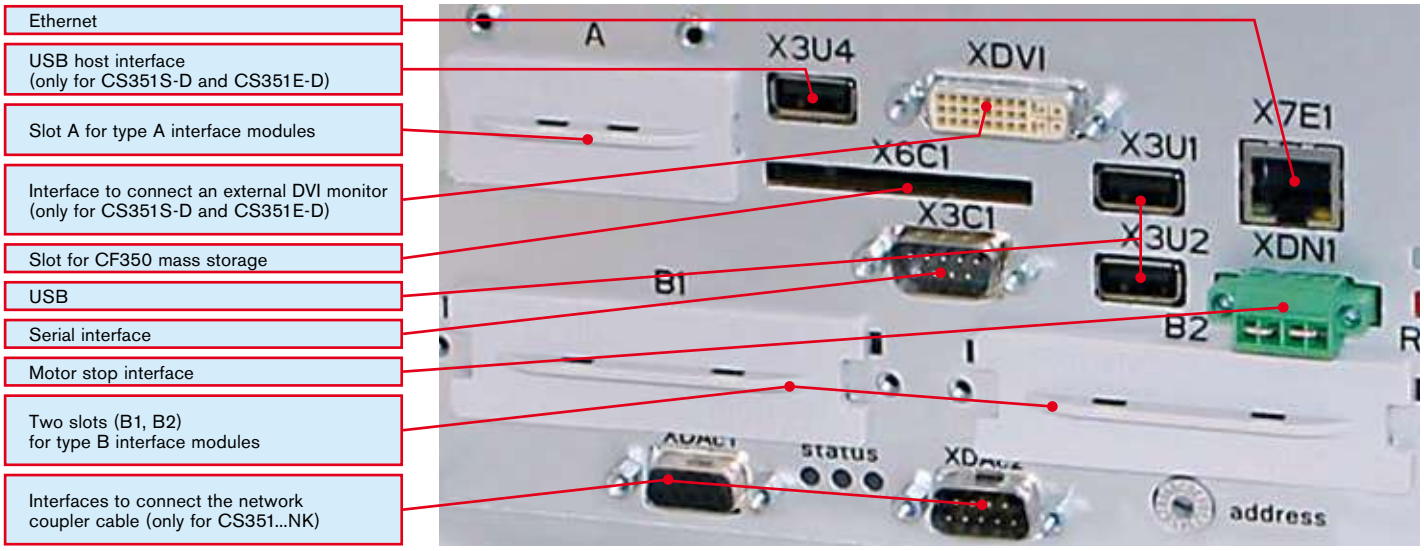
- Secure and fast commissioning
- Clear system design
- Clearly arranged control and display elements
- Flexible adjustment to new tasks

Slots and Connections

To ensure that the Compact System optimally matches your control environment today and in the future, three free interface module slots are included. They are covered with dummy panels ex works.

Additionally, the CS351E-D and CS351S-D Compact Systems have a DVI interface to connect an external monitor and a corresponding USB feedback channel.

To gain a better understanding of the slots, see the CS351 instructions from page 13.



Slot	Field bus/designation	Code	Order no.	Page
P	PROFIBUS DP	IMpdp	0 608 830 266	95
	DeviceNet	IMdev	0 608 830 267	95
	PROFINET IO	IMpnio	0 608 830 272	94
	EtherNet/IP	IMenip	0 608 830 271	94
	Modbus TCP	IMmtcp	0 608 830 273	94
B	24 V I/O interface	IM24V	0 608 830 259	93
X6C1	Mass storage	CF350	3 608 877 428	–
XDAC1 / XDAC2	Network coupler cable	NKL0.5	3 608 877 369	99, 103
		NKL002	3 608 877 370	
		NKL005	3 608 877 371	
		NKL010	3 608 877 372	
		NKLF*	3 608 877 373/...	

Note: For cable selection, see "Rexroth cables" from page 96.

Modular System

The SB356 system box and the BT356 card rack made from durable stainless steel are required in the modular system to support the control and power electronics.

Besides the VM350 power supply module, the BT/SB can also be equipped with up to six tightening channels. The tightening channels comprise a SE352 or SE352M control unit that controls up to two LTS350D servo amplifiers for tightening spindles or LTE350D servo amplifiers for ErgoSpin hand-held nutrunners. Mixed operation of tightening spindles and ErgoSpin on a SE352 or SE352M is possible at any time.

The KE350 or KE350G IL communication unit is responsible for internal and external system communication. It is inserted in the outer BT/SB slot, instead of the sixth servo amplifier. When the KE350 or KE350G IL is inserted in the first SB or in the first BT, up to 16 BT/SB can be connected together via the NK350 or NK350S network coupler and NKL network coupler cables.

The flexibly programmed logic integrated in the KE350G IL is in compliance with IEC 61131-3 and gives the user countless automation options for the entire tightening process.

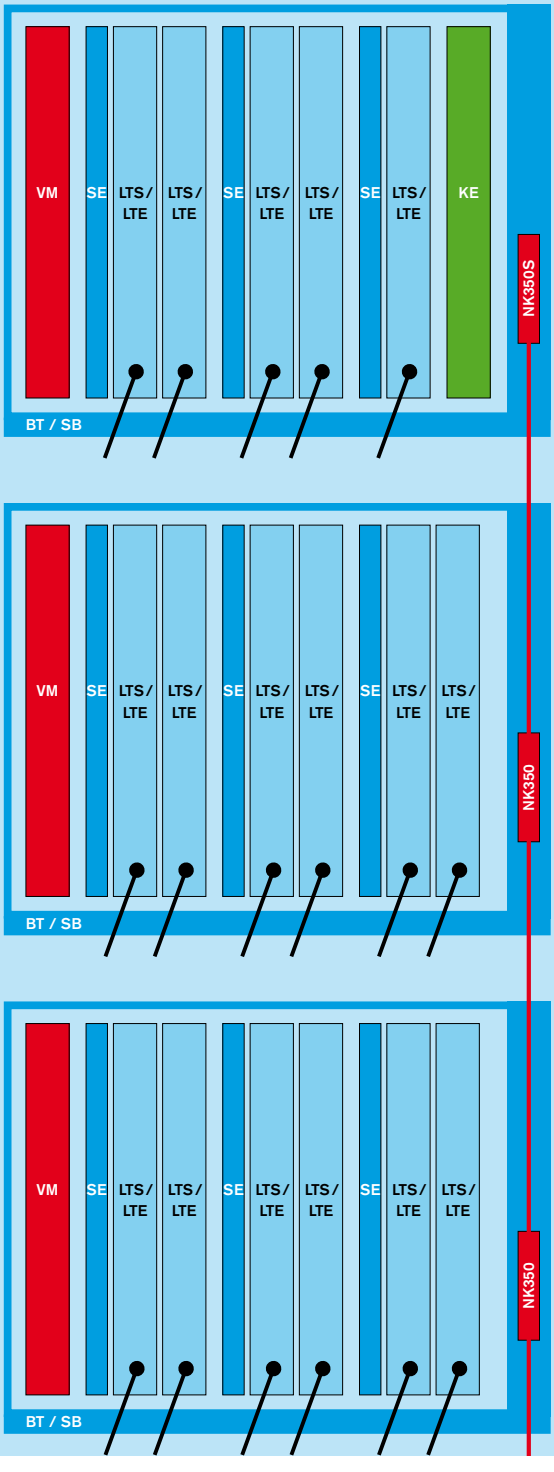
Unused slots must be closed off with dummy panels for safety reasons and for reasons of electromagnetic compatibility.

The splash-proof SB356 system box is intended for operation without a control cabinet in an industrial environment.

The BT356 card rack is intended for installation in control cabinets.

Multi-channel tightening system

- Upgradeable to up to 40 tightening channels
- Combination of tightening spindles/ErgoSpin
- Uncomplicated programming
- Either in card rack or system box
- Convenient installation thanks to modularity



1 card rack/system box for up to 5 tightening channels and communication unit

BT	Card rack
SB	System box
VM	Power supply module
KE	Communication unit
SE	Control unit
LTS	Servo amplifier for tightening spindles
LTE	Servo amplifier for ErgoSpin hand-held nutrunners
NK	Network coupler

Combination of multiple card racks/system boxes for up to 40 tightening channels

Maximum of 6 tightening channels per BT/SB

Total maximum length of all network coupler cables: 150 m

Maximum length of one network coupler cable: 50 m

Control of max. 40 tightening channels with one KE350 (up to 16 network couplers)

Point-to-point connection: defined physical conditions

Multi-colored LED on network coupler for network status display

Type and timing of incoming signals are processed and supplied to the next NK350.

SB356 System Box

The SB356 system box includes the control and power electronics for up to six tightening channels.

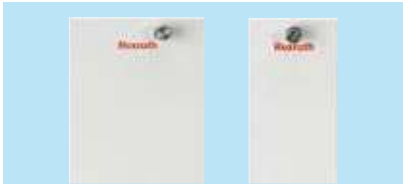
The IP54-protected SB356 system box is designed for operation without a control cabinet.

Up to 16 BT/SB or 40 tightening channels can be connected using the NK350 or NK350S network couplers and NKL network coupler cables.

Code	Dimensions H x W x D [mm]	Weight empty [kg]	Order no.
SB356	600 x 510 x 470	55	0 608 830 251

SB356 system box equipment	Up to 5 channels, 1x SB356	Up to 40 channels, multiple SB356		Info on page
	SB356 system box Number of slots	First SB356 system box Number of slots	Additional SB356 system boxes Slots per SB356	
VM350 power supply module	1	1	1	82
KE350 communication unit	1	1	–	85
SE352/SE352M control unit	3	3	3	83
LTS350D/LTE350D servo amplifier	5	5	6	84
Tightening channels	5	5	6	80/81
NK350S/NK350 network coupler	–	1x NK350S	1x NK350	86

Dummy panels



Empty slots are closed off with dummy panels.
Two versions are available:
BP351 closes a KE or LT slot, BP352 simultaneously closes an SE and an LT slot.

Code	Order no.
BP351	3 608 878 058
BP352	3 608 878 060

Non-standard locks for SB356

Code	Order no.
I1	3 608 874 026
I16	3 608 874 109
3 mm	3 608 874 027
Fiat	3 608 874 028
Daimler	3 608 874 029
7 mm	3 608 874 030

BT356 Card Rack

The BT356 card rack includes the control and power electronics for up to six tightening channels.

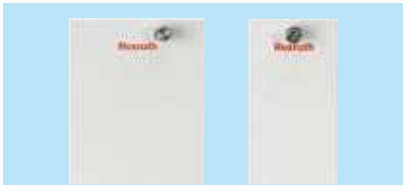
The BT356 card rack is designed for installation in a control cabinet. Alternatively, the BT356 can be fastened to the rear mounting plate using mounting brackets.

Up to 16 BT/SB or 40 tightening channels can be connected using the NK350 or NK350S network couplers and NKL network coupler cables.

Code	Dimensions H x W x D [mm]	Weight empty [kg]	Order no.
BT356	483 x 310 x 381	7	0 608 830 253

Configuration of a BT356 card rack	Up to 5 channels, 1x BT356	Up to 40 channels, Multiple BT 356		Info on page
	BT356 Card Rack Number of slots	First BT356 card rack Number of slots	Other BT356 card racks Number of slots per BT356	
VM350 power supply module	1	1	1	82
KE350 communication unit	1	1	–	85
SE352/SE352M control unit	3	3	3	83
LTS350D / LTE350D servo amplifier	5	5	6	84
Tightening channels	5	5	6	80/81
NK350S / NK350 network coupler	–	1x NK350S	1x NK350	86

Dummy panels



Empty slots are closed off with dummy panels.
Two versions are available:
BP351 closes a KE or LT slot, BP352 simultaneously closes an SE and an LT slot.

Code	Order no.
BP351	3 608 878 058
BP352	3 608 878 060

Mounting brackets for fastening to mounting plate

Type	Order no.
Mounting bracket set	3 608 878 116

Permissible Equipment with Servo Amplifiers from BT356 / SB356

Planning assistance: system box and card rack configuration

A tightening channel consists of the following components:

- Tightening spindle or ErgoSpin hand-held nutrunner
- Connection cable
- Control unit
- Servo amplifier

The KE350 or KE350G IL communication unit is responsible for internal and external system communication. If the appropriate control and power electronics are installed, both stationary tightening spindles and ErgoSpin hand-held nutrunners can be connected to and operated on the SB356 system box and the BT356 card rack. Mixed operation of stationary tightening spindles and ErgoSpin hand-held nutrunners on a system box or a card rack is possible at any time.

Not every configuration is permitted due to the fact that the power consumption of the servo amplifier depends on the type of tightening spindle or ErgoSpin hand-held nutrunner that is connected. The maximum permissible peak current for up to six tightening channels in the card rack or system box is 140 A. This is why you may only install components with a power consumption that does not exceed a total of 140 A.

Total power consumption (tightening spindles + ErgoSpin) ≤ 140 A

You can find an overview of the power consumption of tightening spindles and ErgoSpin hand-held nutrunners in the table below.

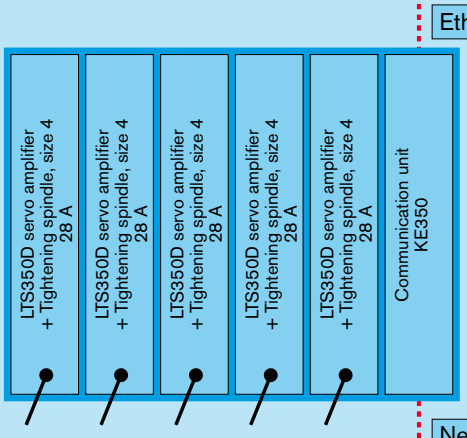
	Stationary tightening spindles				ErgoSpin Hand-Held Nutrunners			
Power consumption [Ampere]	**45 A**	**28 A**	**14 A**	**7 A**	**50 A**	**33 A**	**18 A**	**11 A**
Tightening spindle or ErgoSpin Hand-Held Nutrunners	LTS350D servo amplifier + Tightening spindle, size 5	LTS350D servo amplifier + Tightening spindle, size 4	LTS350D servo amplifier + Tightening spindle, size 3	LTS350D servo amplifier + Tightening spindle, size 2	LTE350D servo amplifier + ErgoSpin Hand-Held Nutrunners ESA100S ESA150S ESA220S ESV073 ESV146	LTE350D servo amplifier + ErgoSpin Hand-Held Nutrunners ESA040... ESA056... ESA065... ESA075... ESM025... ESM035... ESV025 ESV050	LTE350D servo amplifier + ErgoSpin Hand-Held Nutrunners ESA030…	LTE350D servo amplifier + ErgoSpin Hand-Held Nutrunners ESA013... ESM012QD ESV005

Up to 40 tightening channels by combining multiple card racks/ system boxes

- Maximum system security thanks to 100 % digital data transfer
- Universal system for hand-held nutrunners and stationary technology
- Scalable and open for extensions

Example of a wheel nutrunner

In this example, five wheel bolts on each side of the vehicle are tightened to 130 Nm using size 4 tightening spindles.



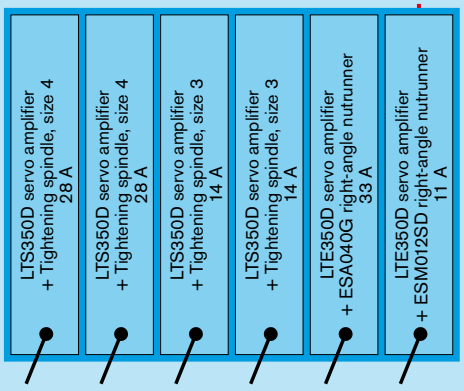
BT / SB power consumption
5 x 28 A = 140 A (≤ 140 A)

Up to 5 tightening spindles can be operated on the first system box/first card rack.

System boxes and card racks can be connected using network couplers.

Example of an engine tightening

In this example, the camshaft bearing cap is tightened on the engine to 15 Nm and the cylinder head to 130 Nm, both using double nutrunners (tightening spindles in sizes 3 and 4). In addition, small parts are tightened using right-angle and pistolgrip nutrunners.



BT / SB power consumption
2 x 28 A + 2 x 14 A + 33 A + 11 A = 128 A (≤ 140 A)

Mixed operation with up to six tightening channels is possible on a SB356 system box or BT356 card rack.

VM350 Power Supply Module

The VM350 power supply module is used to supply power to all the slots in the BT356 card rack or in the SB356 system box.
One VM350 is required for each card rack or system box. There is a 24 V interface (X1S1) on the front side of the VM350. This interface offers an external 24 V supply, with which the control power supplies of KE, SE and LT may be maintained when, under certain "motor stop" conditions, the main power supply is disconnected. Additionally the VM350 incorporates a motor stop interface and a 24 V supply for external consumers.

Code	Order no.
VM350	0 608 750 110

SE352 and SE352M Control Units

The control unit controls and monitors the tightening process of up to two independent tightening channels per control unit. It also carries out the system diagnosis and monitors all individual components of a tightening channel. Tightening processes and rework strategies are simply and flexibly programmed via the BS350 operating program. Automatic recognition of individual components enables fast and secure start-up.
Use in multi-channel tightening systems requires a KE350/KE350G IL communication unit.
The SE352M control unit has one free slot. An IM24V interface module can be inserted in this slot for communication with superior controllers. On delivery, the SE352M control unit slot is sealed with a cover.

Example
SE352M with IM24V

Code	Order no.
SE352	0 608 830 262
SE352M	0 608 830 263

Servo Amplifiers for Tightening Spindles and ErgoSpin Hand-Held Nutrunners

The digital servo amplifier controls the EC motor. The control parameters are transmitted digitally from the SE control unit to the LT servo amplifier.
The integrated motor contactor is an important component for the motor stop function.

There are a variety of servo amplifiers available to fit the different sizes of tightening spindles.
An LTU350/1 servo amplifier is used for all ErgoSpin hand-held nutrunners.

Servo Amplifiers for Tightening Spindles

Servo amplifier Code	For size
LTS350D	For all tightening spindles

Code	Order no.
LTS350D	0 608 750 125

Servo amplifier for ErgoSpin

Servo amplifier Code	
LTE350D	For all ErgoSpin hand-held nutrunners

Code	Order no.
LTE350D	0 608 750 126

KE350 and KE350G IL Communication Units

The KE350 and KE350G IL communication units coordinate the individual control units and organize the interfaces with external systems (e.g. PLC or central computer). The internal system communication with the control units occurs via a standard bus system.

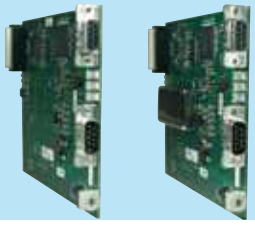
One serial interface and three free slots are available to connect external systems. Via these, the tightening system can be controlled and, if necessary, data can be exchanged. Various interface modules available for controlling and data communication. On delivery, the slots in the KE350 and KE350G IL communication units are closed off with covers.

Integrated logic
Logic is already integrated into the KE350G IL. It can be flexibly programmed in compliance with IEC 61131-3 and gives the user countless automation options for the entire tightening process.

Code	Order no.
KE350	0 608 830 264

Code	Order no.
KE350G IL	0 608 830 265

Accessories for Control and Power Electronics



Network coupler

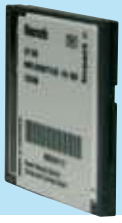
Code	Order no.
NK350	3 608 877 367
NK350S	3 608 877 368
	3 608 877 …

Dummy panels

Code	Order no.
BP351	3 608 878 058
BP352	3 608 878 060

Mounting bracket set for BT356

	Order no.
BTW356	3 608 878 116



Mass storage

Code	Order no.
CF350	3 608 877 428

Note: For information on network coupler cables, see "Rexroth cables" from page 96.

Control Cabinets

Ask us – we would be happy to advise you! With the BT356 card rack, the Rexroth modular system is ideally equipped for use in control cabinets. Benefit from our experience: we can offer you advice on which control cabinet is best suited to your production environment and how control and power electronics can be integrated easily. We provide control cabinets manufactured to your requirements as well as control cabinets in the following standard dimensions:

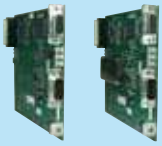
- 1800 x 600 x 500 mm (H x W x D)* for up to 18 tightening channels or 17 tightening channels plus KE350 / KE350G IL for tightening spindles in sizes 2, 3, and 4 (size 5 and combined equipment available upon request)
- 2000 x 600 x 500 mm (H x W x D)* for up to 24 tightening channels or 23 tightening channels plus KE350 / KE350G IL for tightening spindles in sizes 2 and 3 (sizes 4, 5, and combined equipment available on request)

Standard delivery color is RAL 7032. Other options, e.g. other colors, are available on request.

* Dimensions without base

Control and Power Electronics Component Overview

	Designation	Weight [kg]	Code	Order no.	Page
	Compact System for ErgoSpin with TFT	9.7	CS351E-G CS351E-G IL	0 608 830 258 0 608 830 275	74 74
	Compact System for ErgoSpin with display	9.5	CS351E-D CS351E-D IL CS351E-D NK	0 608 830 257 0 608 830 274 0 608 830 281	74 74 74
	Compact System for tightening spindle with TFT	9.7	CS351S-G CS351S-G IL	0 608 830 255 0 608 830 277	74 74
	Compact System for tightening spindle with display	9.5	CS351S-D CS351S-D IL CS351S-D NK	0 608 830 254 0 608 830 276 0 608 830 282	74 74 74
	Mass storage		CF350	3 608 877 428	75
	System box	55 empty	SB356	0 608 830 251	78
	Card rack	7 empty	BT356	0 608 830 253	79
	Dummy panel for servo amplifier or communication unit Dummy panel for controller and servo amplifier		BP351 BP352	3 608 878 058 3 608 878 060	78 78
	Mounting bracket set for BT356		BTW356	3608878116	86

	Designation	Weight [kg]	Code	Order no.	Page
	Power supply module	2.8	VM350	0 608 750 110	82
	Control unit	1.4 without modules 1.4 without modules	SE352 SE352M	0 608 830 262 0 608 830 263	83 83
	Servo amplifier for tightening spindles	2.7	LTS350D	0 608 750 125	84
	Servo amplifier for ErgoSpin	2.7	LTE350D	0 608 750 126	84
	Communication unit	1.5 without modules 1.5 without modules	KE350 KE350G IL	0 608 830 264 0 608 830 265	85 85
	Network coupler	0.08 0.11	NK350 NK350S	3 608 877 367 3 608 877 368 3 608 877 …	– – –
	Metal flange to cable to bulkhead applications			1 070 920 201	–
	Interface module	0.09	IM24V	0 608 830 259	93
	Interface module	0.03 0.03 0.03 0.03 0.03	IMenip IMmtcp IMpnio IMpdp IMdev	0 608 830 271 0 608 830 273 0 608 830 272 0 608 830 266 0 608 830 267	94 94 94 95 95

Open and Flexible: The Interface Modules

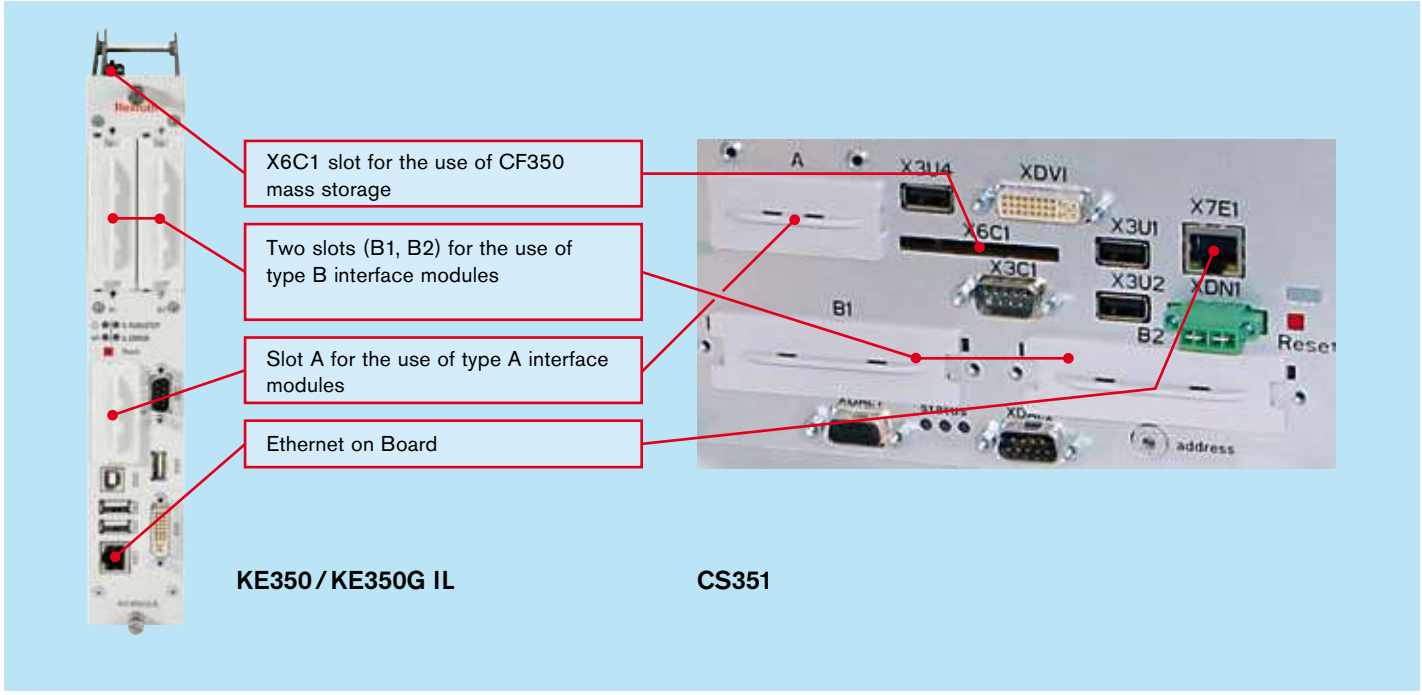
Perfect network connection
The interface modules are the connection between the tightening position, the tightening system, and the company's IT. Today, Rexroth offers customers all common standards of field buses such as PROFIBUS and DeviceNet as well as Ethernet-based field bus systems. The open and modular system concept ensures a reliable integration into future standards. You simply choose the interface module suitable for your connection and the rest of the system remains the same. Retrofitting is no problem – these modules offer flexibility in every detail.

Slots for Interface Modules

To ensure that the tightening system optimally matches your control environment today and in the future, free slots for interface modules are included on the CS351 Compact System, the KE350, and the KE350G IL.

On delivery, the slots are closed off with covers.

The CS351…-D and KE350G IL have an additional DVI interface to connect an external monitor and a corresponding USB feedback channel.



A-slot interface (A)

This interface is intended for the use of type A interface modules from Rexroth.

B-slot interfaces (B1, B2)

These interfaces are intended for the use of type B interface modules from Rexroth.

Slot	Field bus/designation	Code	Order no.	Page
P	PROFIBUS DP	IMpdp	0 608 830 266	95
	DeviceNet	IMdev	0 608 830 267	95
	PROFINET IO	IMpnio	0 608 830 272	94
	EtherNet/IP	IMenip	0 608 830 271	94
	Modbus TCP	IMmtcp	0 608 830 273	94
B	24 V I/O interface	IM24V	0 608 830 259	93
X6C1	Mass storage	CF350	3 608 877 428	–

IM24V Interface Module

IM24V

The IM24V interface module makes it possible to control the tightening system via a 24 V interface or to output 24 V status signals from the tightening system. The IM24V interface module is inserted in a slot on the KE350 or KE350G IL communication unit, the SE352M control unit or the CS351 Compact System. The module provides 10 inputs and 13 outputs. The outputs are short circuit-proof and protected against reverse polarity. The IM24V complies with DIN 19240.

Code	Order no.
IM24V	0 608 830 259

IMenip, IMmtcp, and IMpnio Interface Modules

IMenip

The IMenip is a complete EtherNet/IP interface with adapter function (slave). It includes all the analog and digital components of a powerful EtherNet/IP connection. Data can simply be transferred via the I/O level. The module is certified and tested for interoperability with leading EtherNet/IP scanner modules. Thanks to the standardized hardware and software interface to the KE350, KE350G IL, and the CS351 Compact System, it can easily be exchanged with other field bus modules of the same type.

IMmtcp

The IMmtcp is a complete ModbusTCP interface with server function (slave). It includes all the analog and digital components of a powerful ModbusTCP interface connection. Data can simply be transferred via the I/O level. Thanks to the standardized hardware and software interface to the KE350, KE350G IL, and the CS351 Compact System, it can easily be exchanged with other field bus modules of the same type.

IMpnio

The IMpnio is a complete PROFINET IO interface with IO device function (slave). It includes all the analog and digital components of a powerful PROFINET IO interface connection. Data can simply be transferred via the I/O level. The module complies with the real-time classification (RT) of the PROFIBUS user organization. Thanks to the standardized hardware and software interface to the KE350, KE350G IL and the CS351 Compact System, it can be easily exchanged with other field bus modules of the same type.

Code	Order no.
IMenip	0 608 830 271

Code	Order no.
IMmtcp	0 608 830 273

Code	Order no.
IMpnio	0 608 830 272

IMpdp and IMdev Interface Modules

IMpdp

The IMpdp interface module connects the tightening system to the PROFIBUS DP field bus. The tightening system is then controlled by the superior control system, e.g. the PLC function. Data can simply be transferred via the I/O level. The IMpdp is inserted into the A slot of the KE350 communication unit or the CS351 Compact System. The module has a 400 byte address space on the field bus. Depending on the requirements of the tightening system, this address space can be adjusted from 16 I/16 O points (2 bytes) to 512 I/512 O points (128 bytes) as well as a 0-64-bit ID code and 0-242 bytes of data. The logical configuration of the control signals is set using the BS350 operating system.

IMdev

The IMdev interface module connects the tightening system to the DeviceNet field bus. The tightening system is then controlled by the superior control system, e.g. the PLC. Data can simply be transferred via the I/O level. The IMdev is inserted into the A slot of the KE350... communication unit or the CS351... Compact System. The module occupies a 512 byte address space on the field bus. Depending on the requirements of the tightening system, this address space can be adjusted from 16 I/16 O points (4 bytes) to 512 I/512 O points (128 bytes) as well as a 0-64-byte ID code. The logical configuration of the control signals is set using the BS350 operating system.

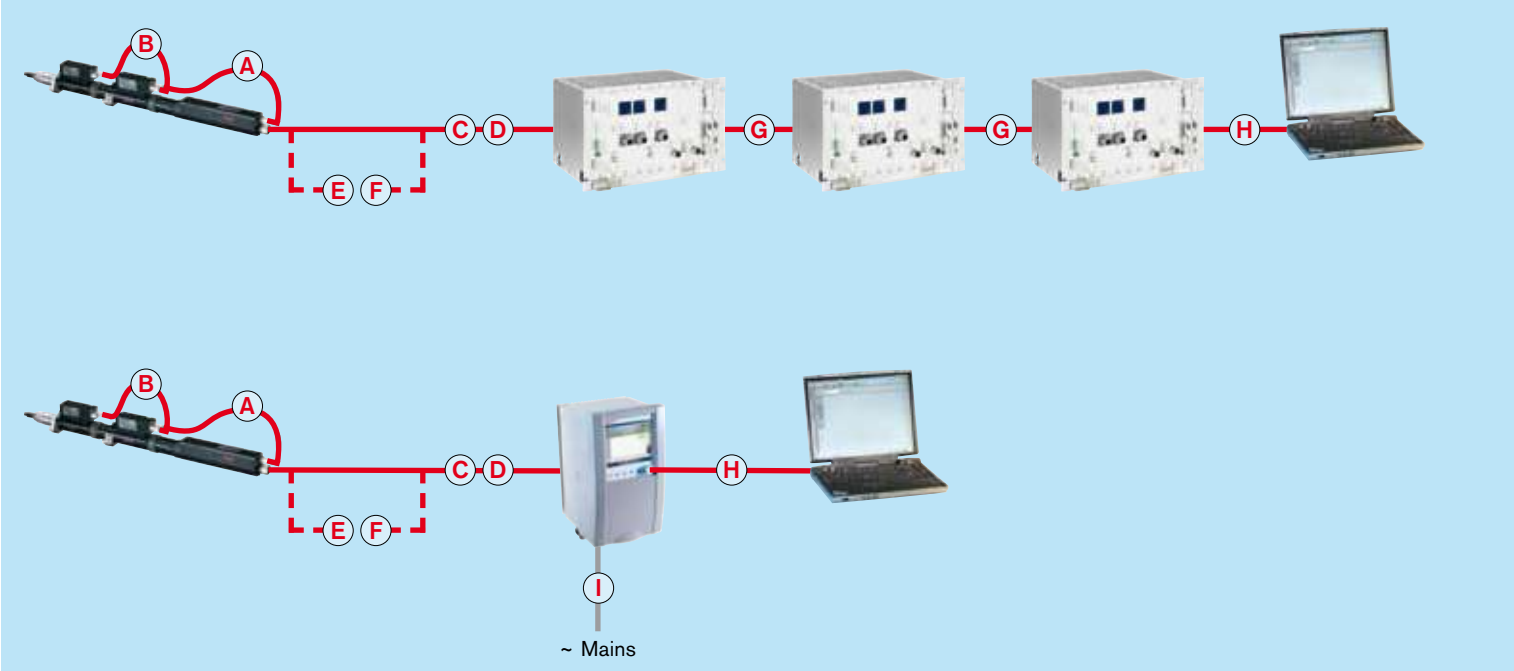
Code	Order no.
IMpdp	0 608 830 266

Code	Order no.
IMdev	0 608 830 267

Rexroth Cables:
100% Digital Signal Transfer

Precise control
and consistently reliable measurements for checking tightening results are the outstanding features of tightening systems from Rexroth. This level of precision requires data transport that is consistently error-free. This is why the tightening systems from Rexroth are equipped with fully digital data communication. Control commands and measured values are transferred and processed without any interference. This guarantees the highest level of reliability and perfect tightening results.

Cables for Tightening Spindles

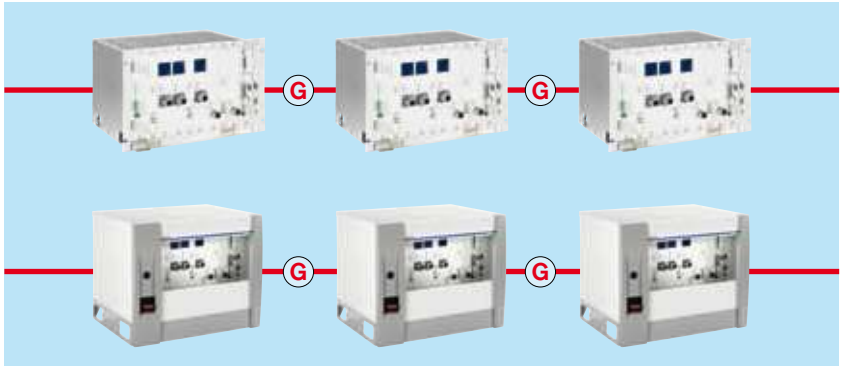


Tightening spindle connection cable

The tightening spindle is connected to the CS351S… Compact System or to the LTS350D servo amplifier via a connection cable. To extend the tightening spindle, up to 5 extension cables may be connected to the connection cable one after the other in any order. For applications in which the tightening spindle is in constant motion, we recommend constructing the connection from several individual parts. The minimum bending radius for the listed connection cables is 132 mm. The total length of the connection cable may be up to 100 m when connecting to a system box or card rack. The connection cable to connect the CS351 Compact System can measure up to 50 meters in length.

Connecting card racks and system boxes

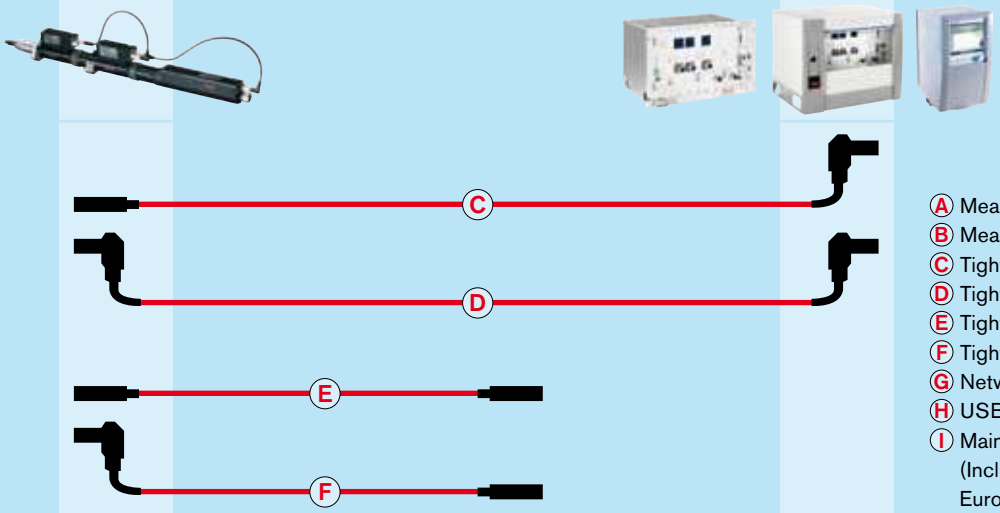
The network coupler cables connect individual BT356 card racks and SB356 system boxes together. A combination of card racks and system boxes is also possible. The length of the network coupler cable between the individual card racks/system boxes can be as much as 50 m. The entire length of all network coupler cables may not exceed 150 m.



Note

To guarantee function and system reliability at all times, only use the cables listed here. The connection cables for tightening spindles are suitable for robot use.

For information on measurement transducer cables, see page 100.



Ⓐ Measurement transducer cable (pages 100/101)
Ⓑ Measurement transducer cable (pages 100/101)
Ⓒ Tightening spindle connection cable straight – angle
Ⓓ Tightening spindle connection cable angle – angle
Ⓔ Tightening spindle extension cable straight–straight
Ⓕ Tightening spindle extension cable angle–straight
Ⓖ Network coupler cable
Ⓗ USB programming cable
Ⓘ Mains connection cable
(Included as standard in the scope of delivery for Europe.)

	Code	Order no.	Length [m]
Ⓒ	SL003	0 608 830 176	3
	SL005	0 608 830 177	5
	SL007	0 608 830 190	7
	SL010	0 608 830 178	10
	SL015	0 608 830 179	15
	SL020	0 608 830 180	20
	SLF*	3 608 872 160 / …	>0,25
Ⓓ	SLW003	0 608 830 227	3
	SLW005	0 608 830 230	5
	SLW007	0 608 830 232	7
	SLW010	0 608 830 242	10
	SLWF*	3 608 872 170 / …	>0,25
Ⓔ	SV003	0 608 830 188	3
	SV005	0 608 830 189	5
	SV007	0 608 830 247	7
	SV010	0 608 830 181	10
	SV015	0 608 830 182	15
	SV020	0 608 830 183	20
	SVF*	3 608 872 180 / …	>0,25
Ⓕ	SVW003	0 608 830 243	3
	SVW005	0 608 830 244	5
	SVW007	0 608 830 245	7
	SVW010	0 608 830 246	10
	SVWF*	3 608 872 190 / …	>0,25

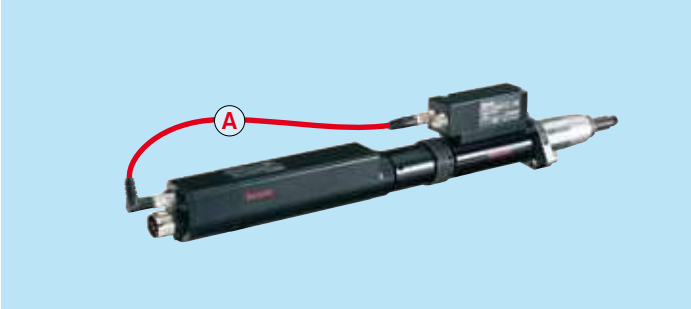
	Code	Order no.	Length [m]
Ⓖ	NKL0.5	3 608 877 369	0,43
	NKL002	3 608 877 370	2
	NKL005	3 608 877 371	5
	NKL010	3 608 877 372	10
	NKLF*	3 608 877 373 / …	>0,25
Ⓗ	USB350	3 608 877 427	3
Ⓘ	CS351USC (110V)**	3 608 877 033	1,8

* The connection cables SLF Ⓒ, SLWF Ⓓ as well as the extension cables SVF Ⓔ, SVWF Ⓕ and the network coupler cable NKLF Ⓖ require a length specification in addition to the part number. The "F" in the code signifies flexible cable length in increments of 0.25 m. At the time of ordering, the length specification must be added to the part number.

Ordering example: Connection cable Ⓒ 17.75 m long is SLF 3 608 872 160 **/ 17.75**

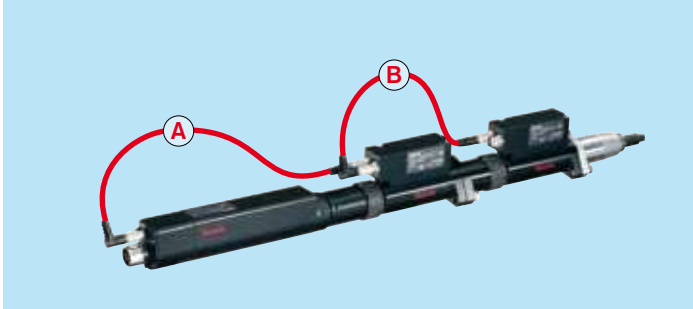
** Mains connection cable, USA
(The mains connection cable is included in the standard scope of delivery for Europe.)

Measurement Transducer Cables



Tightening spindle with spindle bearing, offset output drive or angle head

BG	Ⓐ Code	Order no.
2	ML036	0 608 830 171
3	ML036	0 608 830 171
4	ML046	0 608 830 222
5	ML061	0 608 830 223
5 with blocking adapter	ML072	0 608 830 236

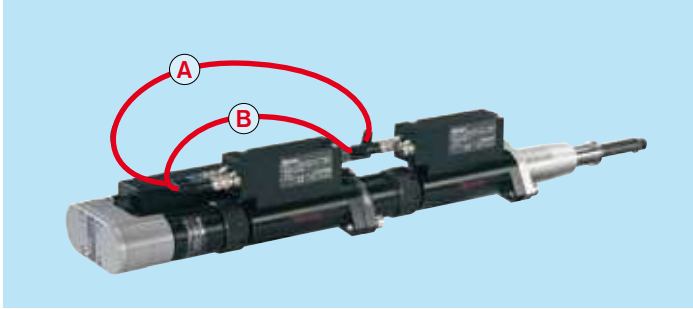


Tightening spindle with spindle bearing, offset output drive or angle head and redundant measurement transducer

BG	Ⓐ Code	Order no.	Ⓑ Code	Order no.
2	ML036	0 608 830 171	MLR033	0 608 830 174
3	ML036	0 608 830 171	MLR033	0 608 830 174
4	ML046	0 608 830 222	MLR033	0 608 830 174
5	ML061	0 608 830 223	MLR040	0 608 830 175

Tightening spindle with transverse gearbox

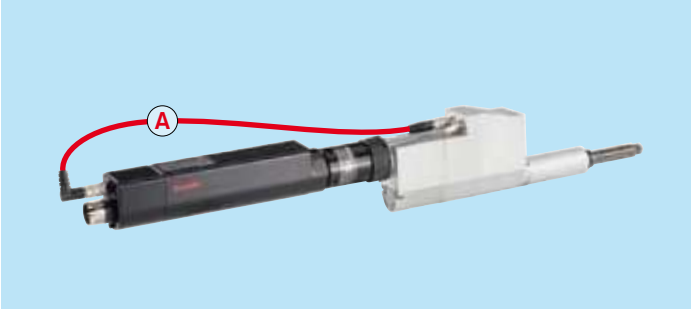
BG	Ⓐ Code	Order no.
2	ML046	0 608 830 222
3	ML046	0 608 830 222
4	ML046	0 608 830 222
5	ML061	0 608 830 223



Tightening spindle with transverse gearbox and redundant measurement transducer

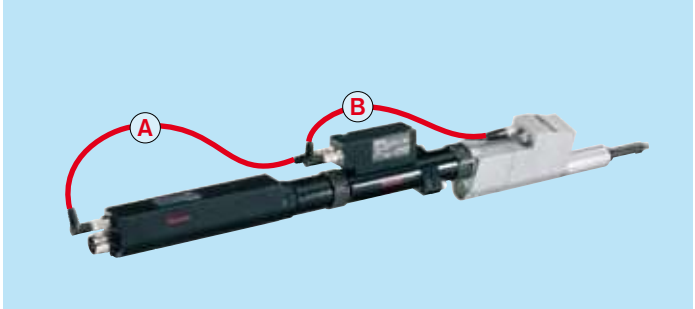
BG	Ⓐ Code	Order no.	Ⓑ Code	Order no.
2	ML046	0 608 830 222	MLR033	0 608 830 174
3	ML046	0 608 830 222	MLR033	0 608 830 174
4	ML046	0 608 830 222	MLR033	0 608 830 174
5	ML061	0 608 830 223	MLR040	0 608 830 175

BG = size for tightening spindles



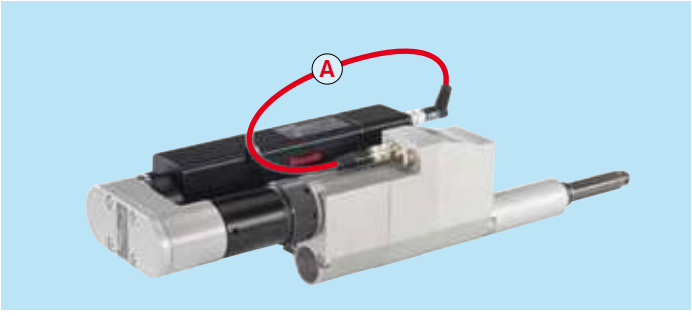
Tightening spindle with offset output drive with integrated measurement transducer

BG	VMC	Ⓐ Code	Order no.
3	3VMC0..	ML046	0 608 830 222
4	4VMC150	ML055	0 608 830 224
4	4VMC210	ML055	0 608 830 224
4	4VMC360	ML061	0 608 830 223



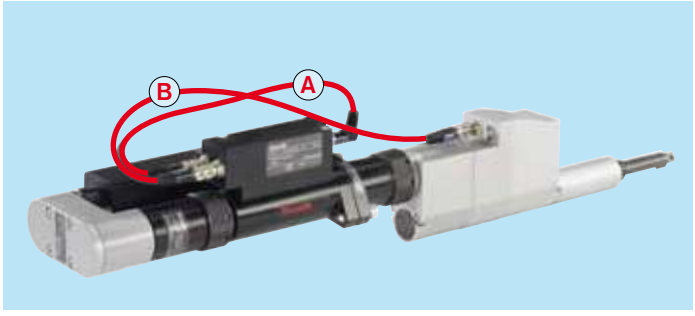
Tightening spindle with offset output drive with integrated measurement transducer and redundant measurement transducer

BG	VMC	Ⓐ Code	Order no.	Ⓑ Code	Order no.
3	3VMC0..	ML036	0 608 830 171	MLR045	0 608 830 225
4	4VMC150	ML046	0 608 830 222	MLR040	0 608 830 175
4	4VMC210	ML046	0 608 830 222	MLR040	0 608 830 175
4	4VMC360	ML046	0 608 830 222	MLR045	0 608 830 225



Tightening spindle with offset output drive with integrated measurement transducer and transverse gearbox

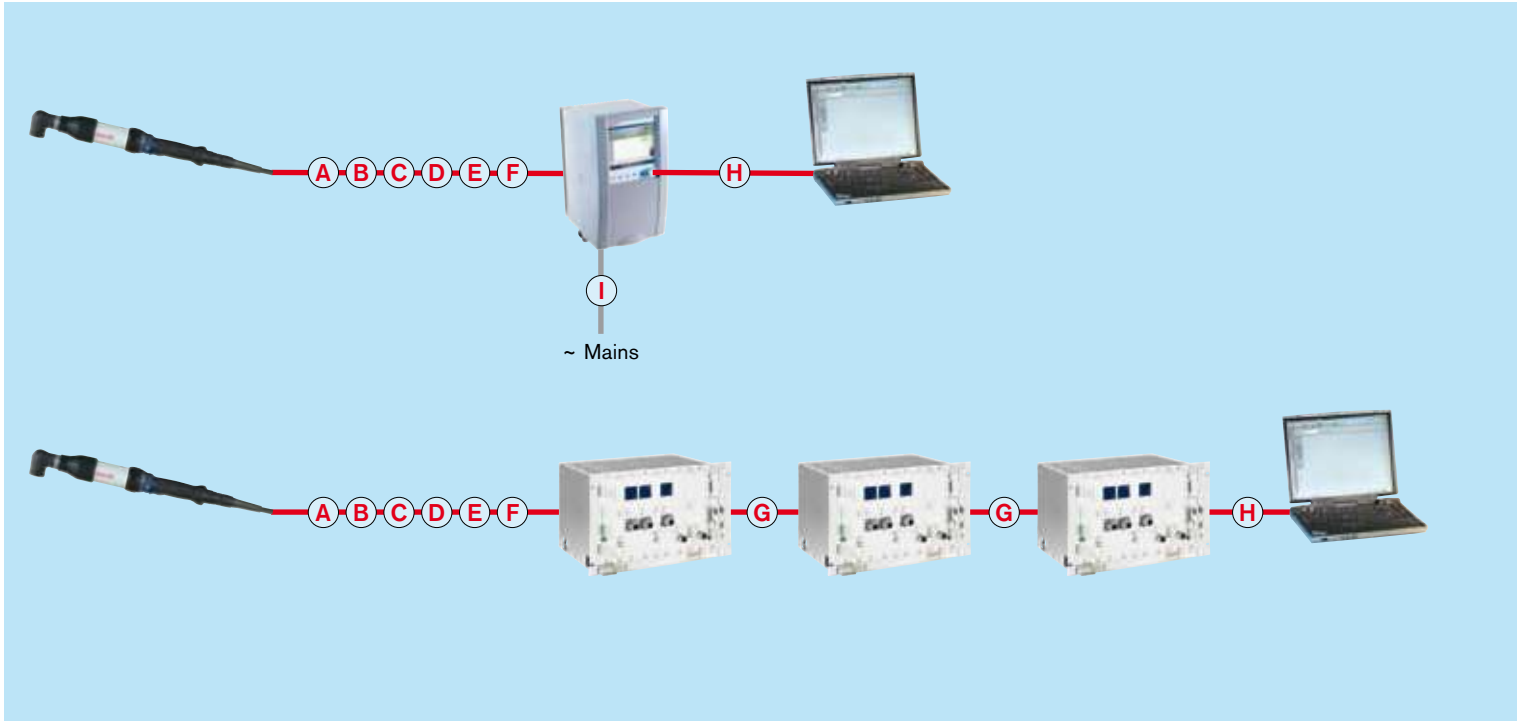
BG	VMC	Ⓐ Code	Order no.
3	3VMC0..	ML036	0 608 830 171
4	4VMC150	ML036	0 608 830 171
4	4VMC210	ML036	0 608 830 171
4	4VMC360	ML036	0 608 830 171



Tightening spindle with offset output drive with integrated measurement transducer and transverse gearbox and redundant measurement transducer

BG	VMC	Ⓐ Code	Order no.	Ⓑ Code	Order no.
3	3VMC0..	ML036	0 608 830 171	MLR045	0 608 830 225
4	4VMC150	ML036	0 608 830 171	MLR040	0 608 830 175
4	4VMC210	ML036	0 608 830 171	MLR040	0 608 830 175
4	4VMC360	ML036	0 608 830 171	MLR045	0 608 830 225

Cables for ErgoSpin Hand-Held Nutrunners



ErgoSpin connection cable

The ErgoSpin hand-held nutrunner is connected to the CS351E… Compact System or to the LTE350D servo amplifier via a connection cable. Up to 5 of the connection cables listed on the right may be connected one after the other in any order. For applications in which the hand-held nutrunner is in constant motion, we recommend constructing the connection from several individual parts. The minimum bending radius for the listed connection cables is 130 mm. The entire length of all bus cables may not exceed 100 m when connecting to a system box or card rack. The connection cable to connect the CS351 Compact System can measure up to 50 meters in length.

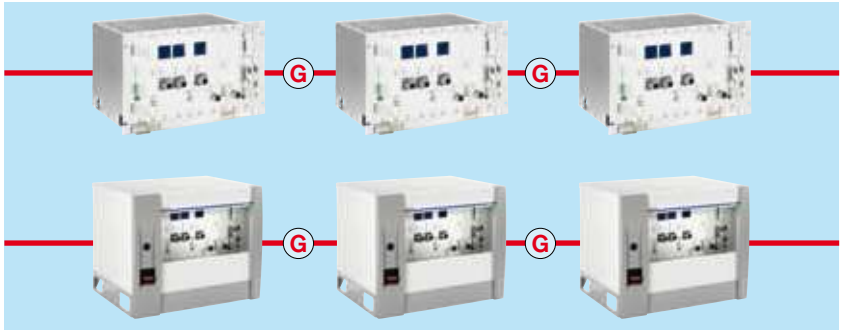
Connecting card racks and system boxes

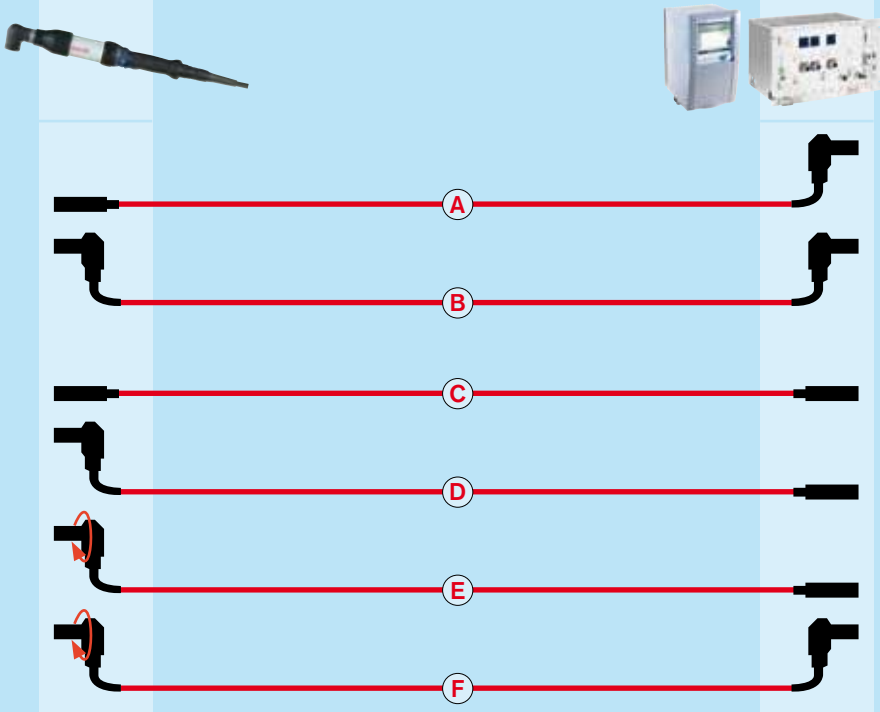
The network coupler cables connect individual BT356 card racks and SB356 system boxes together. A combination of card racks and system boxes is also possible. The length of the network coupler cable between the individual card racks/system boxes can be as much as 50 m. The entire length of all network coupler cables may not exceed 150 m.

Note

To guarantee function and system reliability at all times, only use the cables listed here.

The ErgoSpin connection cables are suitable for robot use.





Ⓐ ErgoSpin connection cable straight – angle
Ⓑ ErgoSpin connection cable angle – angle
Ⓒ ErgoSpin connection cable straight – straight
Ⓓ ErgoSpin connection cable angle – straight
Ⓔ ErgoSpin connection cable angle – straight with freely rotatable right-angle plug
Ⓕ ErgoSpin connection cable angle – angle with freely rotatable right-angle plug
Ⓖ Network coupler cable
Ⓗ USB programming cable
Ⓘ Mains connection cable
(Included as standard in the scope of delivery for Europe.)

	Code	Bestell-Nr.	Länge [m]
Ⓐ	AL003	0 608 750 102	3
	AL005	0 608 750 103	5
	AL007	0 608 750 104	7
	AL010	0 608 750 105	10
	AL015	0 608 750 106	15
	AL020	0 608 750 107	20
	ALF*	3 608 875 061 / …	>0,5
Ⓑ	ALWF*	3 608 875 062	>0,5
Ⓒ	AV003	0 608 750 115	3
	AV005	0 608 750 116	5
	AV010	0 608 750 117	10
	AVF*	3 608 875 063 / …	>0,5
Ⓓ	AW003	0 608 750 118	3
	AW005	0 608 750 119	5
	AW010	0 608 750 120	10
	AWF*	3 608 875 064 / …	>0,5
Ⓔ	AWD003	0 608 750 121	3
	AWD005	0 608 750 122	5
	AWD010	0 608 750 123	10
	AWDF*	3 608 876 471 / …	>0,5
Ⓕ	ALWDF*	3 608 876 472 / …	>0,5

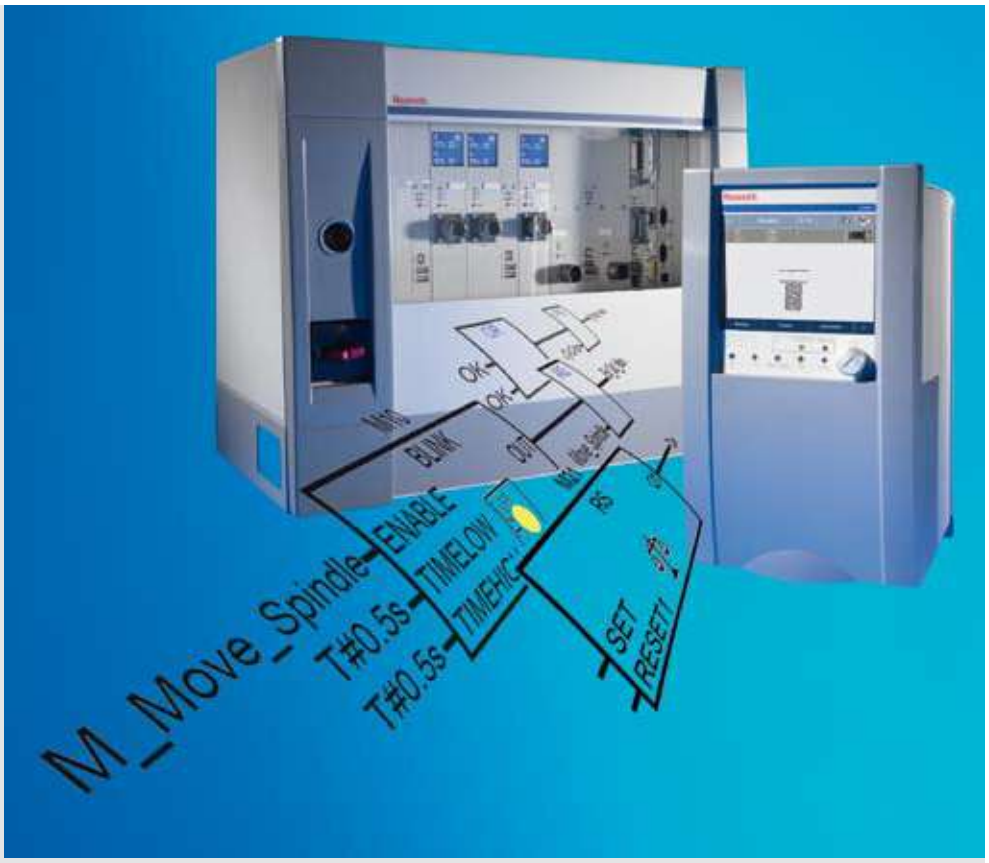
	Code	Bestell-Nr.	Länge [m]
Ⓖ	NKL0.5	3 608 877 369	0,43
	NKL002	3 608 877 370	2
	NKL005	3 608 877 371	5
	NKL010	3 608 877 372	10
	NKLF*	3 608 877 373 / …	>0,5
Ⓗ	USB350	3 608 877 427	3
Ⓘ	CS351USC (110V)**	3 608 877 033	1,8

* The connection cables ALF Ⓐ, ALWF Ⓑ, AVF Ⓒ, AWF Ⓓ, AWDF Ⓔ, ALWDF Ⓕ and NKLF Ⓖ require a length specification in addition to the part number. The "F" in the code signifies flexible cable length in increments of 0.25 m. At the time of ordering, the length specification must be added to the part number.

Ordering example: Connection cable Ⓐ 17.75 m long is ALF 3 608 875 061 / 17.75

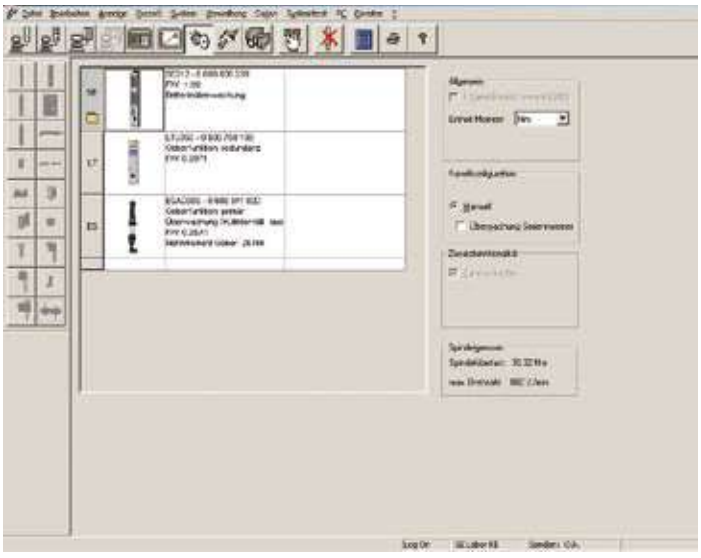
** Mains connection cable, USA
(The mains connection cable is included in the standard scope of delivery for Europe.)

The Complete Package: Software and Operating System



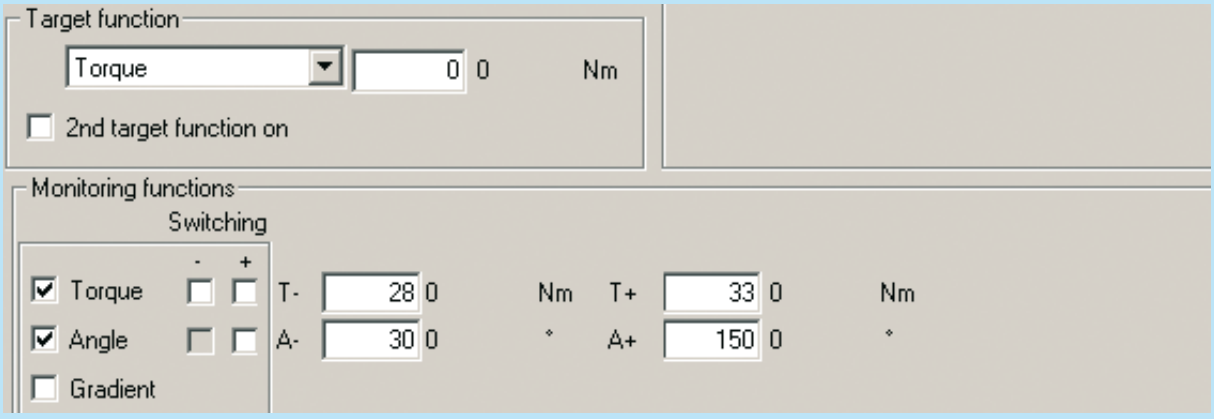
Convenient programming and analyzing:
with the PC via the network or with the laptop directly on-site. This provides users with a flexible working environment. The BS350 operating system can be installed using the System Stick on any PC via USB. This allows users to generate tightening programs as well as analyze tightening cases and conduct system tests. The user interface with menus and clear icons can be operated intuitively.

BS350 Operating System

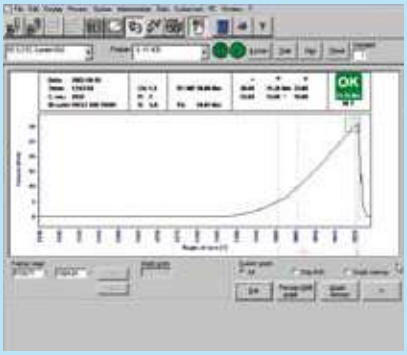


Intuitive, reliable tightening processes

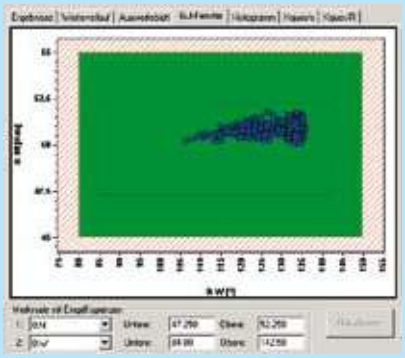
System installation and programming of individual tightening tasks is done via convenient, icon-supported tools. Tightening processes are configured on the graphic interface.



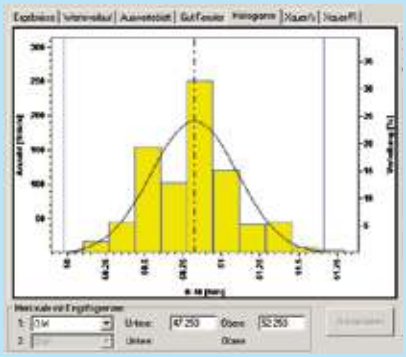
You can easily enter target and monitoring parameters in the preset windows.



Graph
The tightening graph helps you quickly analyze tightening cases.



Good range window
The good range window clearly shows you the location of tightening results in the target window.



Histogram
The histogram gives you a quick overview of the statistical distribution of the tightening results.

System requirements

Windows 2000, Windows XP, Vista, Windows 7, Pentium® or compatible microprocessors with at least 500 MHz, a minimum of 128 MB RAM and at least 100 MB of free hard drive memory. 1024 x 768 graphics resolution. Connection to tightening system: via USB or Ethernet.

Rexroth is constantly adapting its products to meet the latest technological standards and thus retains the right to change its software and firmware. Find out about the latest software as well as software and firmware updates on the Internet at: www.boschrexroth.com/tightening

Code	Order no.	Language versions
BS350 V2.200 1*	0 608 830 283	de/en/fr/it/es/pt/cs/hu/sk/pl/ru/zh
BS350 V2.200 2**	0 608 830 284	de/en/fr/it/es/pt/cs/hu/sk/pl/ru/zh
BS350 V2.200 3***	0 608 830 285	de/en/fr/it/es/pt/cs/hu/sk/pl/ru/zh

* 1x license
** 10x license
*** Plant license

de = German
fr = French
it = Italian
en = (US) English
es = Spanish
pt = Portuguese
cs = Czech
hu = Hungarian
sk = Slovakian
pl = Polish
ru = Russian
zh = Simplified Chinese

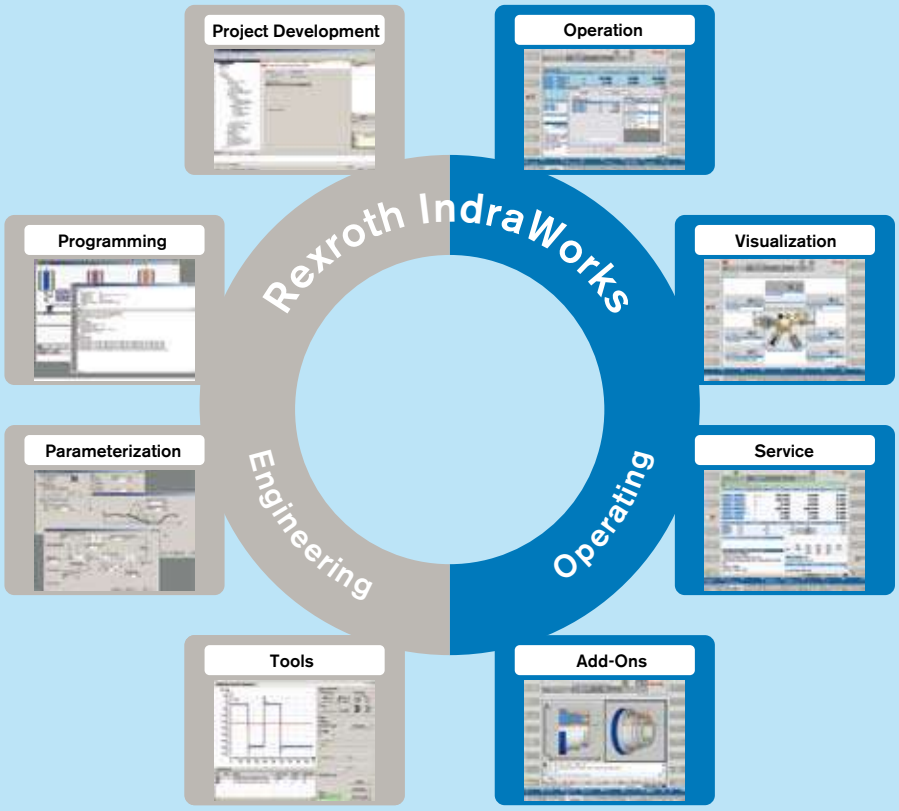
IndraWorks – the Tool for all Engineering Tasks

Rexroth IndraWorks allows you to solve all tasks in a uniform and intuitive software environment – from project planning and programming to visualization and diagnostics.

The uniform engineering framework IndraWorks is consistently available for all systems from Rexroth. You, as user, profit from the fast and transparent access to all functions and system data of the automation components. The standardized tools and interfaces help you to solve all engineering tasks centrally with a single software.

Your benefits

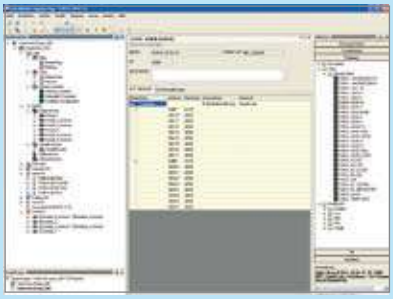
- Available for all systems and solutions from Rexroth
- Integrated framework for all engineering tasks
- Consistent operating environment for project planning, programming, visualization and diagnostics
- Central project management with intuitive system navigation
- Intelligent operation with wizard support
- Comprehensive online help
- Uniform programming according to the PLC standard IEC 61131-3
- PLCopen-conform function block and technology libraries
- Standardized interfaces for communication
- Transparent access to all system components
- Integrated FDT/DTM interface for integration of the DTM of third-party manufacturers



IndraWorks – the universal engineering framework

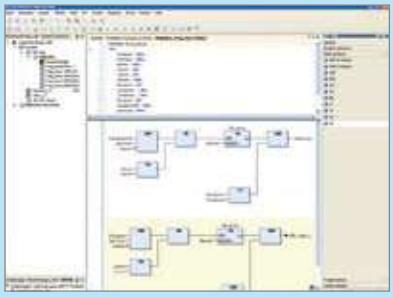
- One tool for all automation tasks
- Goal reached quickly through startup guide
- Offline configuration of projects
- Comfortable programming environment

Project development



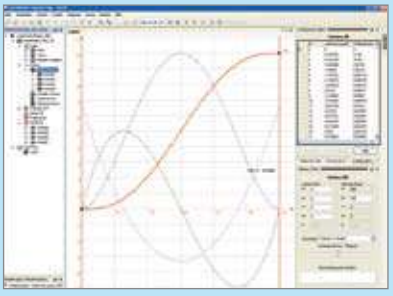
The overall system is uniformly and consistently projected for all solutions. User and multi-project management are available in all instances. The project and device explorers provide access to all system components. With its clearly organized dialog boxes, IndraWorks guides you intuitively through the configuration of your system.

Programming



The IndraLogic runtime system that is integrated in all solutions is consistently programmed in IndraWorks. The complete language scope specified in IEC 61131-3 is available. System-specific additional functions, such as motion blocks according to PLCopen or technology blocks, can be quickly and transparently implemented in your logic programs.

Tools



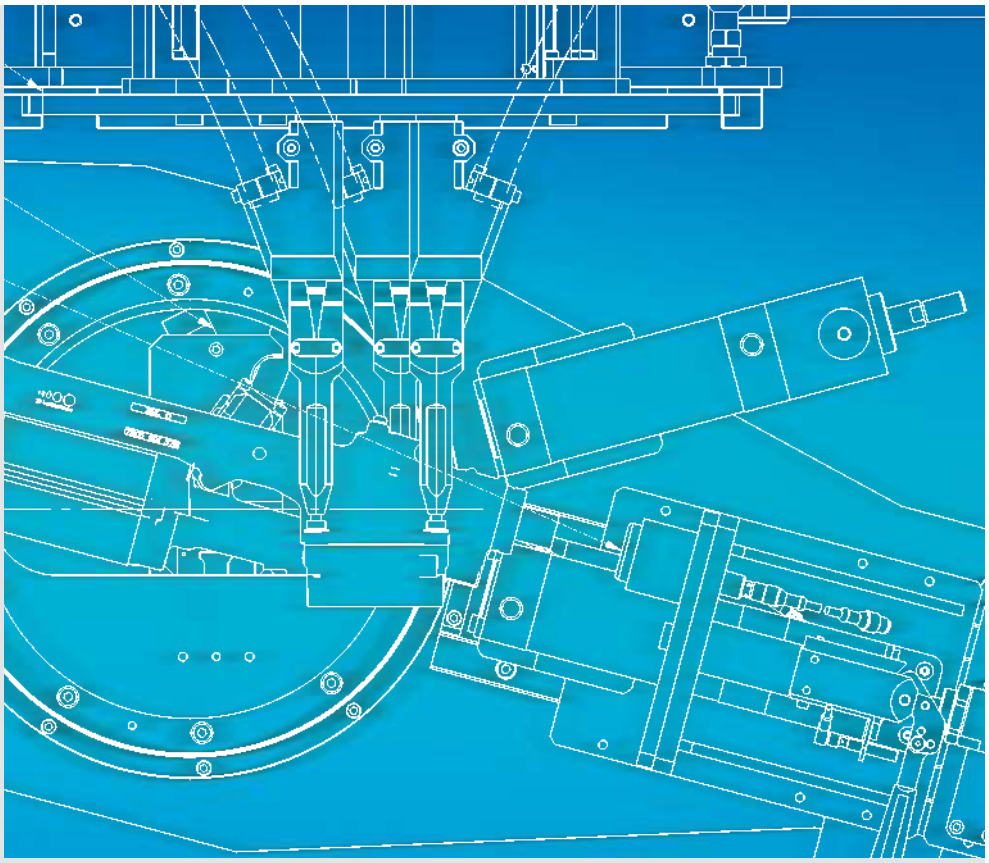
The tools for all engineering tasks are integrated in IndraWorks. Additional solution-specific tools are consistently available in the software framework.

Ordering data for software

Description	Type code	Order number
IndraWorks for Tightening System 350	SWA-IWORKS-350-09VRS-D0-DVD	R911327013

You can find information on IndraWorks for the Tightening System 350 in the Internet at www.boschrexroth.com/schraubtechnik.

Customized Solutions



Rexroth know-how

Rexroth combines its comprehensive range of products with a unique depth of application experience. Tightening technology specialists develop the optimum solution for all tightening jobs in cooperation with you and machine builders. In addition, Rexroth's processes and philosophy are a perfect fit for users of assembly technology, industrial handling, robot systems, and mechatronic production automation. As a company of the Bosch Group, Rexroth stands for consistency, innovation, and quality, thus meeting the highest requirements. Make use of our expertise – we would be happy to advise you.

Customized Solutions

Handling devices with torque support for tightening spindles and ErgoSpin hand-held nutrunners.

Telescopic balancer for fatigue-free work with hand-held tightening spindles thanks to low displacement resistance.

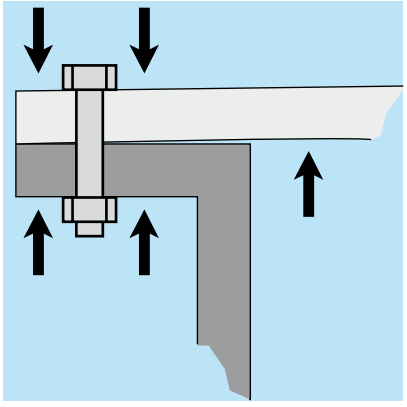
Fully automatic tightening stations – also with nutrunner supply – that can be completely integrated into production lines.

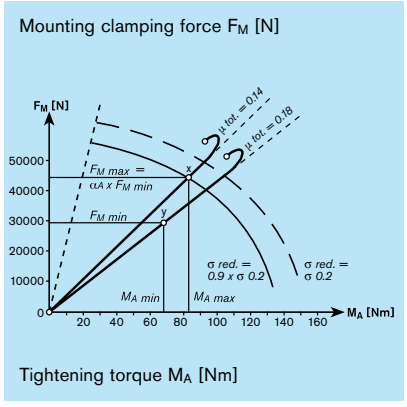
Worker guides and automated solutions for all aspects of the tightening position.

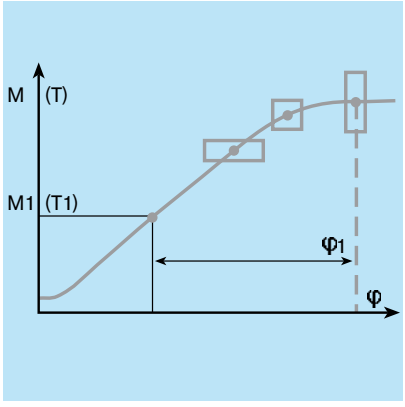
Rating of a Tightening Connection

The basic value for the rating of a tightening connection is the clamp force required to ensure the functioning of the tightening connection. Clamp force Fk must always be greater than the acting force FA to be expected in operation ($F_k > F_A$).
The maximum number of bolts and their maximum thread value result from the design conditions, i.e. the space available for the bolts. A maximum permissible force of F_{max} can be calculated taking into consideration the stress cross-section of the bolt and the number of bolts.

With current available technology it is not possible to directly measure the clamp force (pretensioned force) during the tightening process. Therefore, it is necessary to rely on torque and angle of turn instead. Especially in the case of torque-controlled tightening processes the clamp force is extremely influenced by the friction under the bolt head and in the threads. A tightening connection should be so designed that the minimal attainable pretensioned force FM_{min} guarantees the functioning of the tightening connection, but the maximum pretensioned force FM_{max} does not destroy the tightening connection or bolt. In order to be able to make a statement as to how the cited values will effect the mounting clamp force, the tightening factor $\alpha A = \frac{FM_{max}}{FM_{min}}$ was established in VDI 2230.







Example:
M10 DIN 912-12 g μ total = 0.14-0.18

Clamping Force Table According to VDI 2230

Size	Prop. class	Mounting clamp forces $F_{M\,Tab}$ in kN for μ_G =							Tightening torques M_A in Nm for $\mu_K = \mu_G$ =						
		0.08	0.10	0.12	0.14	0.16	0.20	0.24	0.08	0.10	0.12	0.14	0.16	0.20	0.24
M4	8.8	4.6	4.5	4.4	4.3	4.2	3.9	3.7	2.3	2.6	3.0	3.3	3.6	4.1	4.5
	10.9	6.8	6.7	6.5	6.3	6.1	5.7	5.4	3.3	3.9	4.6	4.8	5.3	6.0	6.6
	12.9	8.0	7.8	7.6	7.4	7.1	6.7	6.3	3.9	4.5	5.1	5.6	6.2	7.0	7.8
M5	8.8	7.6	7.4	7.2	7.0	6.8	6.4	6.0	4.4	5.2	5.9	6.5	7.1	8.1	9.0
	10.9	11.1	10.8	10.6	10.3	10.0	9.4	8.8	6.5	7.6	8.6	9.5	10.4	11.9	13.2
	12.9	13.0	12.7	12.4	12.0	11.7	11.0	10.3	7.6	8.9	10.0	11.2	12.2	14.0	15.5
M6	8.8	10.7	10.4	10.2	9.9	9.6	9.0	8.4	7.7	9.0	10.1	11.3	12.3	14.1	15.6
	10.9	15.7	15.3	14.9	14.5	14.1	13.2	12.4	11.3	13.2	14.9	16.5	18.0	20.7	22.9
	12.9	18.4	17.9	17.5	17.0	16.5	15.5	14.5	13.2	15.4	17.4	19.3	21.1	24.2	26.8
M7	8.8	15.5	15.1	14.8	14.4	14.0	13.1	12.3	12.6	14.8	16.8	18.7	20.5	23.6	26.2
	10.9	22.7	22.5	21.7	21.1	20.5	19.3	18.1	18.5	21.7	24.7	27.5	30.1	34.7	38.5
	12.9	26.6	26.0	25.4	24.7	24.0	22.6	21.2	21.6	25.4	28.9	32.2	35.2	40.6	45.1
M8	8.8	19.5	19.1	18.6	18.1	17.6	16.5	15.5	18.5	21.6	24.6	27.3	29.8	34.3	38.0
	10.9	28.7	28.0	27.3	26.6	25.8	24.3	22.7	27.2	31.8	36.1	40.1	43.8	50.3	55.8
	12.9	33.6	32.8	32.0	31.1	30.2	28.4	26.6	31.8	37.2	42.2	46.9	51.2	58.9	65.3
M10	8.8	31.0	30.3	29.6	28.8	27.9	26.3	24.7	36	43	48	54	59	68	75
	10.9	45.6	44.5	43.4	42.2	41.0	38.6	36.2	53	63	71	79	87	100	110
	12.9	53.3	52.1	50.8	49.4	48.0	45.2	42.4	62	73	83	93	101	116	129
M12	8.8	45.2	44.1	43.0	41.9	40.7	38.3	35.9	63	73	84	93	102	117	130
	10.9	66.3	64.8	63.2	61.5	59.8	56.3	52.8	92	108	123	137	149	172	191
	12.9	77.6	75.9	74.0	72.0	70.0	65.8	61.8	108	126	144	160	175	201	223
M14	8.8	62.0	60.6	59.1	57.5	55.9	52.6	49.3	100	117	133	148	162	187	207
	10.9	91.0	88.9	86.7	84.4	82.1	77.2	72.5	146	172	195	218	238	274	304
	12.9	106.5	104.1	101.5	98.8	96.0	90.4	84.8	171	201	229	255	279	321	356
M16	8.8	84.7	82.9	80.9	78.8	76.6	72.2	67.8	153	180	206	230	252	291	325
	10.9	124.4	121.7	118.8	115.7	112.6	106.1	99.6	224	264	302	338	370	428	477
	12.9	145.5	142.4	139.0	135.4	131.7	124.1	116.6	262	309	354	395	433	501	558
M18	8.8	107	104	102	99	96	91	85	220	259	295	329	360	415	462
	10.9	152	149	145	141	137	129	121	314	369	421	469	513	592	657
	12.9	178	174	170	165	160	151	142	367	432	492	549	601	692	769
M20	8.8	136	134	130	127	123	116	109	308	363	415	464	509	588	655
	10.9	194	190	186	181	176	166	156	438	517	592	661	725	838	933
	12.9	227	223	217	212	206	194	182	513	605	692	773	848	980	1092
M22	8.8	170	166	162	158	154	145	137	417	495	567	634	697	808	901
	10.9	242	237	231	225	219	207	194	595	704	807	904	993	1151	1284
	12.9	283	277	271	264	257	242	228	696	824	945	1057	1162	1347	1502
M24	8.8	196	192	188	183	178	168	157	529	625	714	798	875	1011	1126
	10.9	280	274	267	260	253	239	224	754	890	1017	1136	1246	1440	1604
	12.9	327	320	313	305	296	279	262	882	1041	1190	1329	1458	1685	1877
M27	8.8	257	252	246	240	234	220	207	772	915	1050	1176	1292	1498	1672
	10.9	367	359	351	342	333	314	295	1100	1304	1496	1674	1840	2134	2381
	12.9	429	420	410	400	389	367	345	1287	1526	1750	1959	2153	2497	2787

Guide values for clamp forces (FM) and tightening torques (MA) for headless bolts with metric coarse-pitch threads according to DIN ISO 262 and head dimensions for hexagon bolts according to DIN EN ISO 4014 to 4018 or fillister head bolts according to DIN EN ISO 4762, and "central" hole according to DIN EN 20 273.

Glossary

Angle head	Output drive components which are used from above, usually on the hand-held nutrunner, if there is limited space available (e.g. inner housing tightening).
Avg. efficiency	Quotient calculated from output drive performance and drive performance. The output drive performance and drive performance depend on the speed and torque, which is why efficiency is not constant.
Block output drive	Combines multiple installation spindles for tight hole templates or small circle diameters.
Center-to-center distance	See multiple connections
Controllers	Controls and monitors the tightening process or exchanges data with superior controllers.
Crowfoot wrench	Special components designed for very tight and hard-to-reach tightening positions.
DVI	Digital Visual Interface – interface for the digital transfer of video data.
EC motor	Electronic Commutated motor – a brushless, and thus maintenance-free, motor.
ErgoSpin	A hand-held nutrunner designed according to the latest findings in ergonomics.

Feed gripper	Component used to supply and store screws to the tightening tool.
Feed Output Drive	Output drive components for deep-seated tightening positions (e.g. motor plugs).
Gradient	Inclination of a tangent in the torque/angle of turn graph.
Handling device	Manually-operated, hand-held tightening modules which the worker uses to approach the tightening position and carry out the tightening operation without exerting any force. Depending on the design, the handling device can also support the reverse torque (reaction torques).
IEC 61131-3	Internationally recognized standard for programming languages of programmable logic controllers.
I/O	Input/output – I/O are discrete interfaces for sending and receiving digital signals.
IP54 protection class	Suitability of components for certain ambient conditions, e.g. for industrial systems. IP54 refers to the protection against splash water and dust.
Max. output drive speed	Defined by the interaction of EC motor, planetary gearbox and output drive.
Measurement transducer	Spindle component that analyzes the torque, angle, and gradient and is equipped with an integrated cycle counter.

Multiple connections	Minimum permissible distance between the tightening positions.
Offset Output Drive	Output drive component for tight center to center distances where the spline shaft and drive unit are offset.
Output drive	Spindle components that include the tightening tool (e.g. tightening nut).
Range of spring	Travel output which results from engaging the tightening module and tightening until the screw-in depth is reached.
Redundant measurement transducer	At least two independent measurement transducers that continually record the same parameters.
Size (BG)	Tightening spindles are available in sizes 2 – 5, the sizes cover different working ranges.
Socket tray	Container for various tool inserts. Corresponding tightening programs are activated when the tools are removed.
Spindle Bearing	Output drive component with straight spline shaft which supports the tightening tool (e.g. tightening nut).
System Stick	A USB stick included in the scope of delivery that contains, among other things, the installation program for the BS350 Operating System and the system documentation.

Tightening case analysis	Analysis of torque and angle-of-turn measurements taken during tightening, on the basis of which conclusions about the tightening process and the quality of the tightening connection can be made.
Tightening channel	Includes all components required for a tightening job: tightening spindle or ErgoSpin hand-held nutrunner, connection cable, as well as control and power electronics.
Tool mount	Interface between the tightening spindle and tool. For example, a square is a typical tool mount for a tightening nut as a tool.
Tightening program	Controls the tightening process and is divided into various tightening steps, where tightening parameters are set.
Tightening position	Refers to the defined location where the tightening job is performed using a tightening channel and a tightening program.
Tightening station	Hand-held, manually-operated, or automatic tightenings are carried out on a tightening station. It can be a part of an assembly line.
Tightening system	A complete system with all of the tightening channels that are needed to carry out the defined tightening case. It communicates with a superior controller.
Working range	Permissible torque range of tightening spindle/ErgoSpin.

Further Information

With each of our products you acquire a piece of the reliability and quality which sets Rexroth products above the rest.
Additional information on Rexroth's tightening technology can be found in the Internet at:
www.boschrexroth.com/schraubtechnik

Information on Rexroth's documentation and brochures can be found at:
www.boschrexroth.com/medienverzeichnis

Automation Systems
and Control Components
DE: R999000026
EN: R999000027

Retrofit Solutions
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Drive & Control Academy
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Information on electric drives and controls can be found at:
www.boschrexroth.com/electrics

Rexroth Service information can be found at:
www.boschrexroth.com/service

Current information and offers can be found at:
www.boschrexroth.de/academy

Many global tasks – one contact

Wherever vehicles are built or outsourced components are manufactured: Rexroth is always on-site to offer comprehensive support.

Rexroth tightening technology – active on a global scale
Regardless where new production plants appear, Rexroth is already there. Rexroth's large group of knowledgeable engineering, sales and service professionals have an increasing presence in over 80 countries. Bosch Rexroth AG uses the application expertise garnered from its global activities on each individual site, anywhere in the world, and combines it with local competence. Project planning, commissioning, training and service: We always speak your language.

Lifelong partnership – customized service
The comprehensive service network reliably ensures rapid response. At Rexroth, our service concept extends well beyond supplying replacement parts and setting up on-site consignment depots. Rexroth Service personnel work on-site at the client's plant in close cooperation with the end user. Condition monitoring and remote maintenance concepts or innovative service packages for all drive and control technologies enhance equipment availability and improve the planning of maintenance cycles. This reliable partnership accompanies products and services through their entire life cycle.

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