

Control and power electronics

The hardware platform is based on cutting-edge technology 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.



- ▶ Compact and powerful
- ▶ Secure and fast commissioning
- ▶ Sturdy: IP54
- ▶ Combination of tightening spindles/ErgoSpin
- ▶ Well arranged control and display elements
- ▶ Flexible connection to control and archive systems
- ▶ High process reliability due to internal self-diagnostics



Maximum flexibility in controller configuration – here are just some of the many options:

1

One nutrunner – multiple nutrunners?

COMPACT SYSTEM OR MODULAR SYSTEM

- ▶ 1 tightening channel = CS351 Compact System page 112
- ▶ 2 to 40 tightening channels = 350 Modular System page 118

2

350 Modular System – where to store the system components?

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.

3

Universal communication – the KE communication unit

CONFIGURATION OF THE 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/LTE servo amplifiers (tightening spindle/ErgoSpin respectively) Max. 5 LTS/LTE per BT/SB

4

1, 2, 3... and many more

CONNECTING MULTIPLE BT CARD RACKS/SB SYSTEM BOXES

- ▶ Multiple BT/SB are connected to NK network couplers. Configuration from 2nd BT/SB:
- ▶ No KE is required from the 2nd BT/SB upwards. Max. 3 SE pro BT/SB
- ▶ Another LTS/LTE can be inserted in its position. Max. 6 LTS/LTE per BT/SB

CS351 Compact System

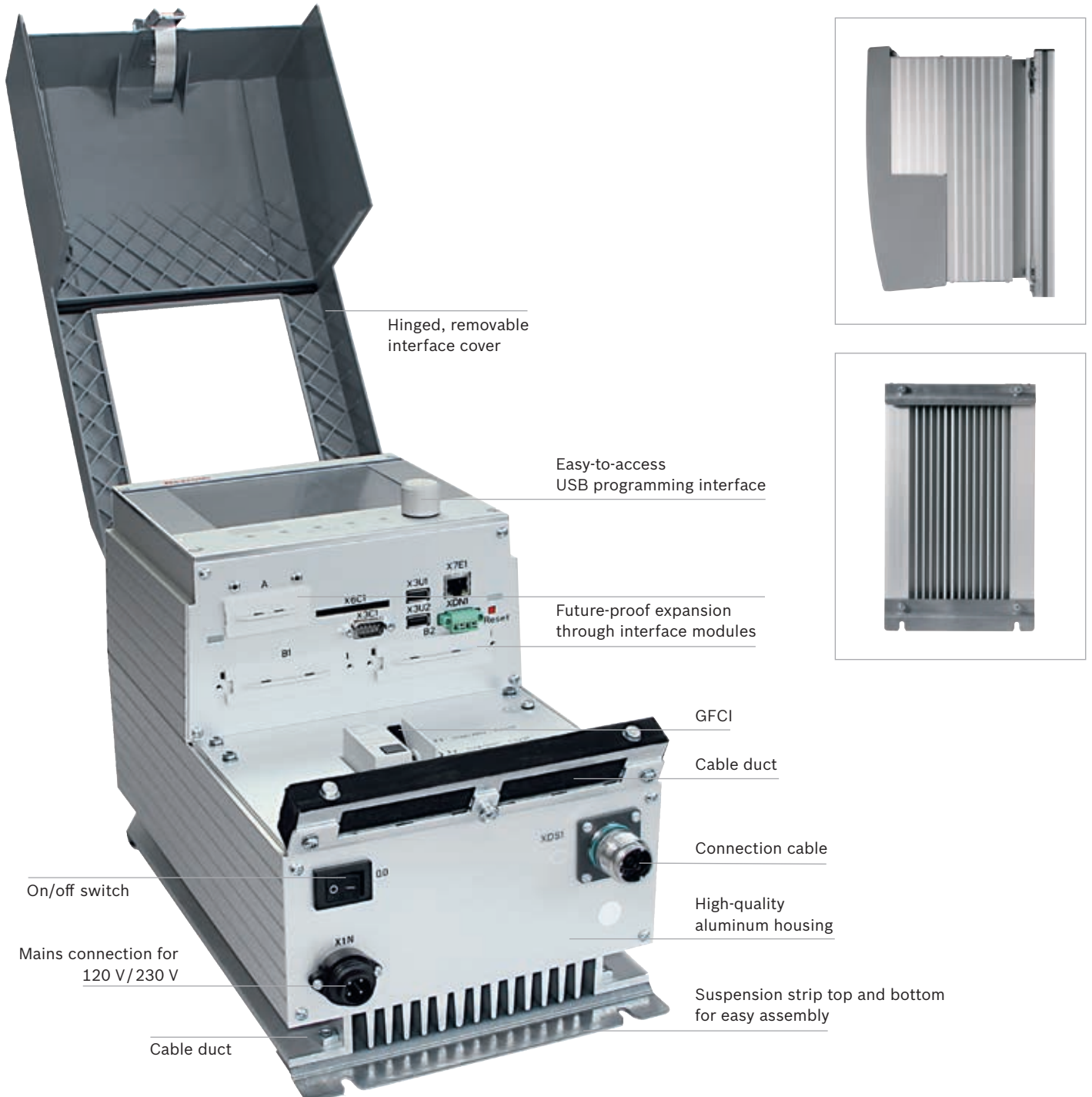
The operating and display units, as well as the connections, are arranged in a userfriendly, modern, and convincing design. The clear structure of the CS351 allows intuitive operation without any complicated configuration.

The housing, which is not larger than a minitower, fully complies with protection class IP54. Its compact interior combines power electronics and Ethernet-based bus systems with the new highperformance 350 control generation.

FEATURES

- ▶ Compact and powerful
- ▶ Clear system design
- ▶ Secure and fast commissioning
- ▶ Tightening results at a glance, including curves
- ▶ Clearly arranged control and display elements
- ▶ Sturdy: IP54, EMC severity level IV
- ▶ USB and Ethernet-based bus systems
- ▶ Flexible adaptation to new tasks





CS351 Compact System – model variants



COMPACT SYSTEM CS351...-G... HIGH-QUALITY TFT WITH TOUCH SCREEN AND LARGE VIEWING ANGLE

- ▶ Resolution: 640x480
- ▶ Display size: 6.5 inches
- ▶ Actual value display
- ▶ Tightening graph display
- ▶ Parameter changes
- ▶ Ethernet on board
- ▶ Tightening program selection

COMPACT SYSTEM CS351...-D... DISPLAY VERSION WITH DVI INTERFACE

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

Compact System for	Code	Weight kg	Order no.
ErgoSpin	CS351E-G	9.7	0 608 830 258
	CS351E-D	9.5	0 608 830 257
	CS351E-G IL	9.7	0 608 830 275
	CS351E-D IL	9.5	0 608 830 274
	CS351E-D NK	9.9	0 608 830 281
Tightening spindle	CS351S-G	9.7	0 608 830 255
	CS351S-D	9.5	0 608 830 254
	CS351S-G IL	9.7	0 608 830 277
	CS351S-D IL	9.5	0 608 830 276
	CS351S-D NK	9.9	0 608 830 282

Note: For cable selection, see "Rexroth cables" from page 136.

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 for 230 V included in the scope of delivery
- ▶ Motor stop interface
- ▶ RCD with CS351E-...
- ▶ Exchange connection cable – without tools

* The speed of size 5 motors is 15% lower with an operating voltage of 120 V than with an operating voltage of 230 V. The torque of the size 5 motors is 30% lower with an operating voltage of 120 V than with an operating voltage of 230 V.

CS351...IL

- ▶ Integrated logic
- ▶ Flexible programming according to IEC 61131-3
- ▶ Easy automation for the entire tightening process

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

NOTE

You can find the technical data for the Rexroth control electronics in the assembly instruction:

www.boschrexroth.com/tightening.

CC-CS351 Compact System for CC-ErgoSpin



- ▶ For CC-ErgoSpin hand-held nutrunner control
- ▶ Use in function and un-critical tightening applications according to classes B and C of VDI/VDE 2862

FEATURES

- ▶ Secure and fast commissioning
- ▶ Tightening results at a glance
- ▶ Sturdy: IP54, EMC severity level IV
- ▶ USB and Ethernet interface
- ▶ Clear system design
- ▶ Flexible adaptation to new tasks
- ▶ Clearly arranged control and display elements
- ▶ System not fieldbus capable; 24V I/O

NOTE

You can find the technical data for the Rexroth control electronics in the assembly instruction:

www.boschrexroth.com/tightening.

Compact System for	Code	Weight kg	Order no.
CC-ErgoSpin	CC-CS351E-D	9.5	0 608 830 289

Slots and connections

To ensure that the tightening system optimally matches your control environment today and in the future, it features three slots for interface modules, which are covered with dummy panels at the factory.

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



- 1 Slot A for fieldbus interface modules (at CC-CS351 without function)
- 2 USB host interface (only for CS351S-D and CS351E-D)
- 3 Interface to connect an external DVI monitor (only for CS351S-D and CS351E-D)
- 4 Slot for mass storage CF350 1GB
- 5 Ethernet interface
- 6 Serial interface
- 7 Two USB interfaces
- 8 Motor stop interface
- 9 Two slots (B1, B2) for 24V I/O interface modules

Slot	Fieldbus / description	Code	Order no.	Page
A	PROFIBUS DP	IMpdp	0 608 830 266	134
	DeviceNet	IMdev	0 608 830 267	134
	PROFINET IO	IMpnio	0 608 830 272	134
	PROFINET IO	IMpnio2	0 608 830 312	134
	EtherCat	IMecat	0 608 830 302	135
	Ethernet/IP	IMenip	0 608 830 271	135
	Ethernet/IP	IMenip2	0 608 830 313	135
	Modbus TCP	IMmtcp	0 608 830 273	135
B	24V I/O interface	IM24V	0 608 830 259	135
X6C1	Mass storage	CF350 1GB	0 608 830 318	129
XDAC1 / XDAC2	Network coupler cable	NKL0.6	3 608 877 369	139/143
		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 136.

Modular System



- ▶ Multi-channel tightening system
- ▶ Can be upgraded 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

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 an 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 outermost BT/SB slot, instead of the sixth servo amplifier.



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

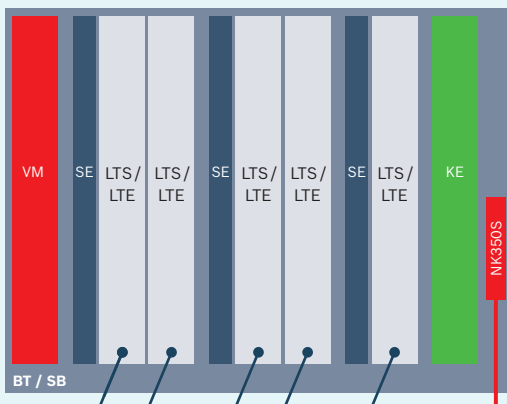


The BT356 card rack is intended for installation in control cabinets.

When the KE350 or KE350G IL is inserted in the first SB or the first BT, up to 16 BT/SB can be connected via the NK350 or NK350S network coupler and NKL network coupler cables.

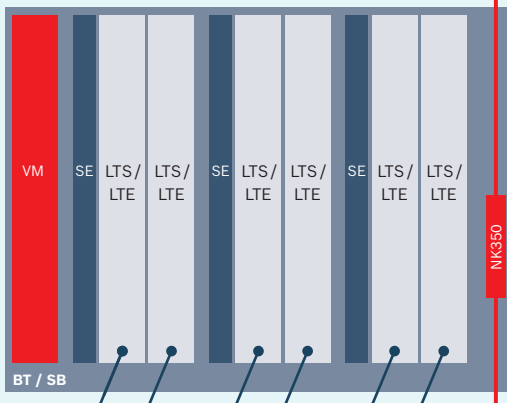
The flexibly programmable logic integrated in the KE350G IL is in compliance with IEC 61131-3 and gives the user countless automation options for the entire tightening process.

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



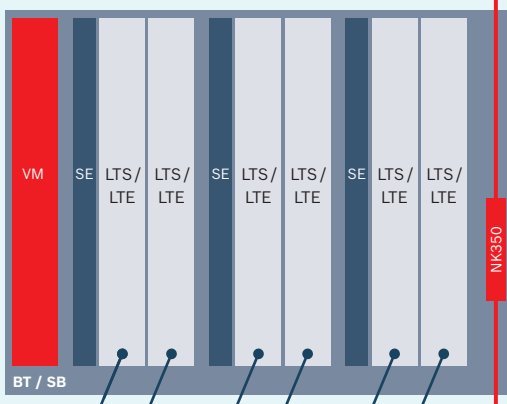
1 CARD RACK/SYSTEM BOX FOR UP TO 5 TIGHTENING CHANNELS AND COMMUNICATION UNIT

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

- ▶ Max. 6 tightening channels per BT/SB
- ▶ Max. total length of all network coupling cables: 150 m
- ▶ Max. length of one network coupling cable: 50 m
- ▶ Control of max. 40 tightening channels with one KE350 (up to 16 network couplers)
- ▶ Reliable system bus with diagnostics capabilities
- ▶ Multi-colored LED on network coupler for network status display
- ▶ Type and timing of the incoming signals are processed and supplied to the nearest NK350.



SB356 System Box



- ▶ To accommodate the control and power electronics for up to six tightening channels
- ▶ IP54 protection class

FEATURES

- ▶ Designed for operation without control cabinet
- ▶ For networking of up to 16 BT/SB (with NK350 or NK350S network coupler and NKL network coupler cables)
- ▶ Compact dimensions
- ▶ High packing density
- ▶ Combination of hand-held nutrunner and stationary spindle possible (except CC-ErgoSpin)
- ▶ Fast replacement of control and power components

Code	Dimensions W x H x D mm	Weight (empty) kg	Order no.
SB356	510x600x470	55	0608830251

SB356 system box configuration	Up to 5 channels, 1 x SB356	Up to 40 channels, multiple SB356		Info on page
	SB356 system box	First SB356 system box	Additional SB356 system boxes	
	Number of slots	Number of slots	Number of slots per SB356	
VM 350 power supply module	1	1	1	125
KE350 communication unit	1	1	–	128
SE352/SE352M control unit	3	3	3	126
LTS350D/LTE350D servo amplifier	5	5	6	127
Tightening channels	5	5	6	123/132
NK350S / NK350 network coupler	–	1 x NK350S	1 x NK350	129





DUMMY PANELS

Empty slots are closed off with dummy panels.

Two versions are available: BP351 closes off a KE or LT slot; BP352 simultaneously closes off an SE and an LT slot.



NON-STANDARD LOCKS FOR SB356

Code	Order no.
E1	3608874026
E16	3608874109
 3 mm*	3608874027
 Fiat	3608874028
 Daimler	3608874029
 7 mm	3608874030

* Standard design

Note: You can find the technical data for the Rexroth control electronics in the assembly instruction: www.boschrexroth.com/tightening.

REQUIRED NUMBER OF DUMMY PANELS FOR THE BT356 CARD RACK WITH KE350

Number of channels	BP351 3608878058	BP352 3608878060
1	2	2
2	1	2
3	1	1
4	0	1
5	0	0

BT356 card rack



- ▶ To accommodate the control and power electronics for up to six tightening channels
- ▶ For assembly in the control cabinet or to the mounting plate using mounting brackets

FEATURES

- ▶ For networking of up to 16 BT/SB (with NK350 or NK350S network coupler and NKL network coupler cables)
- ▶ Compact dimensions

Code	Dimensions W x H x D mm	Weight (empty) kg	Order no.
BT356	310x483x381	7	0608830253

BT356 system box configuration	Up to 5 channels 1 x BT356	Up to 40 channels Multiple BT356		Info on page
	BT356 card rack	First BT356 card rack	Additional BT356 card racks	
	Number of slots	Number of slots	Number of slots per BT356	
VM 350 power supply module	1	1	1	122
KE350 communication unit	1	1	–	122
SE352/SE352M control unit	3	3	3	122
LTS350D/LTE350D servo amplifier	5	5	6	122
Tightening channels	5	5	6	122/132
NK350S / NK350 network coupler	–	1 x NK350S	1 x NK350	122

Note: You can find the technical data for the Rexroth control electronics in the assembly instruction: www.boschrexroth.com/tightening.

Permissible configuration with BT356/SB356 Servo amplifiers

PLANNING ASSISTANCE: SYSTEM BOX AND CARD RACK CONFIGURATION

One tightening channel consists of the following components:

- ▶ ErgoSpin hand-held nutrunner or tightening spindle
- ▶ 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 ≤ 140 A (TIGHTENING SPINDLES + ERGOSPIN)

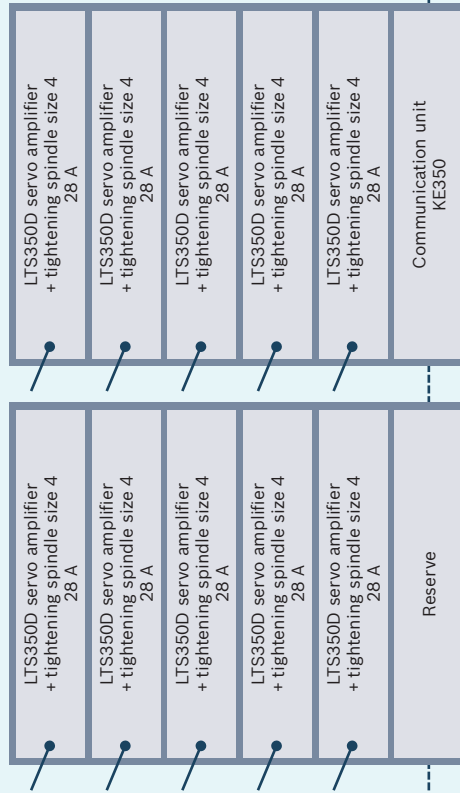
- ▶ Up to 40 tightening channels by combining multiple card racks/system boxes
- ▶ Maximum system reliability thanks to 100% digital data transfer
- ▶ Integrated system for hand-held nutrunners and stationary technology
- ▶ Scalable and open for extensions

Max. power consumption Ampere	Stationary tightening spindles				ErgoSpin hand-held nutrunners			
	45 A	28 A	14 A	7 A	50 A	33 A	18 A	11 A
Tightening spindle or ErgoSpin hand-held nutrunner	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	LTE 350D servo amplifier + ErgoSpin hand-held nutrunners ESA100S ESA150S ESA220S ESV073 ESV146	LTE 350D servo amplifier + ErgoSpin hand-held nutrunners ESA040... ESA056... ESA065... ESA075... ESM025... ESM035... ESV025 ESV050	LTE 350D servo amplifier + ErgoSpin hand-held nutrunners ESA030...	LTE 350D servo amplifier + ErgoSpin hand-held nutrunners ESA013... ESM012QD ESV005 ESV012

EXAMPLE: WHEEL BOLTS



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



Ethernet connection

BT/SB power consumption
 $5 \times 28 \text{ A} = 140 \text{ A} (\leq 140 \text{ A})$

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

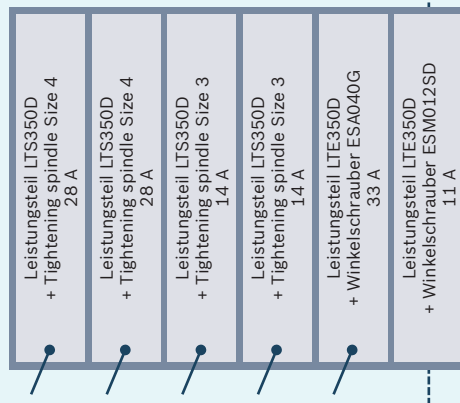
Networking with network coupler

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

EXAMPLE: MOTOR CONNECTION



In this example, the camshaft bearing cap and the cylinder head are each tightened to the motor with double nutrunners (size 3 and 4 tightening spindles) with 15 Nm and 130 Nm respectively. In addition, small parts are tightened with rightangle and pistolgrip nutrunners.



Networking with network coupler

BT/SB power consumption
 $2 \times 28 \text{ A} + 2 \times 14 \text{ A} + 33 \text{ A} + 11 \text{ A} = 128 \text{ A} (\leq 140 \text{ A})$

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

VM350 power supply module



- ▶ Used to supply power to all the slots in the BT356 card rack or in the SB356 system box.

Code	Order no.
VM350	0 608 750 110

FEATURES

- ▶ One VM350 is required for each card rack or system box.
- ▶ 24 V interface (X1S1) on the front to ensure external power supply of the KE, SE, and LT in event of power failure or if the supply is switched off
- ▶ Integrated E-stop functionality (performance level d)
- ▶ 24 V power supply for external consumers

SE352 and SE352M control units



- ▶ To control and monitor the tightening process of up to two independent tightening channels per control unit
- ▶ For hand-held nutrunners and stationary spindles

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



Example layout
SE352M with IM24V

FEATURES

- ▶ Carries out 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 system.
- ▶ Automatic recognition of individual components enables fast and secure start-up.
- ▶ The SE352M control unit is equipped with one free slot (on delivery, the SE352M control unit slot is sealed with a cover). An IM24V interface module can be inserted in this slot for communication with superior controllers.
- ▶ USB port interface used for the insertion of the license stick for the angle compensation functionality.

Servo amplifiers for tightening spindles and ErgoSpin hand-held nutrunners



- ▶ For EC motor control
- ▶ Integrated motor contactor

Code		Order no.
LTS350D	For all tightening spindles	0 608 750 125
LTE350D	For all ErgoSpin hand-held nutrunners	0 608 750 126

FEATURES

- ▶ The control parameters are transmitted digitally from the SE control unit to the LT servo amplifier
- ▶ LC display for tightening results and system information
- ▶ Integrated E-stop functionality (performance level d)

KE350 and KE350G IL communication units



- ▶ To coordinate individual control units and organize the interfaces with external systems (e.g. PLC or central computer)

Code	Order no.
KE350	0 608 830 264
KE350G IL	0 608 830 265

FEATURES

- ▶ System-internal communication with the control units occurs via a standard bus system
- ▶ One serial interface and three free slots for connecting to external systems
- ▶ Various interface modules are available for controlling and data communication
- ▶ On delivery, the slots in the KE350 and KE350G IL communication units are closed off with covers
- ▶ Integrated logics in KE350G IL: flexible programming in compliance with IEC 61131 3, enables countless automation options for the entire tightening process

Accessories for control and power electronics



NETWORK COUPLER

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

*with integrated 24V power supply for the system bus



DUMMY PANELS

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



MOUNTING BRACKET SET FOR BT356

Code	Order no.
BTW356	3608878116



MASS STORAGE

Code	Memory size	Order no.
CS350 1G	1 GB	0608830318

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:

- ▶ 1,800x600x500 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 mixed configurations available on request)
- ▶ 2,000x600x500 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 and 5 and mixed configurations available on request)

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

CONTROL CABINETS

On request



RACK FOR 2 SYSTEM BOXES

On request

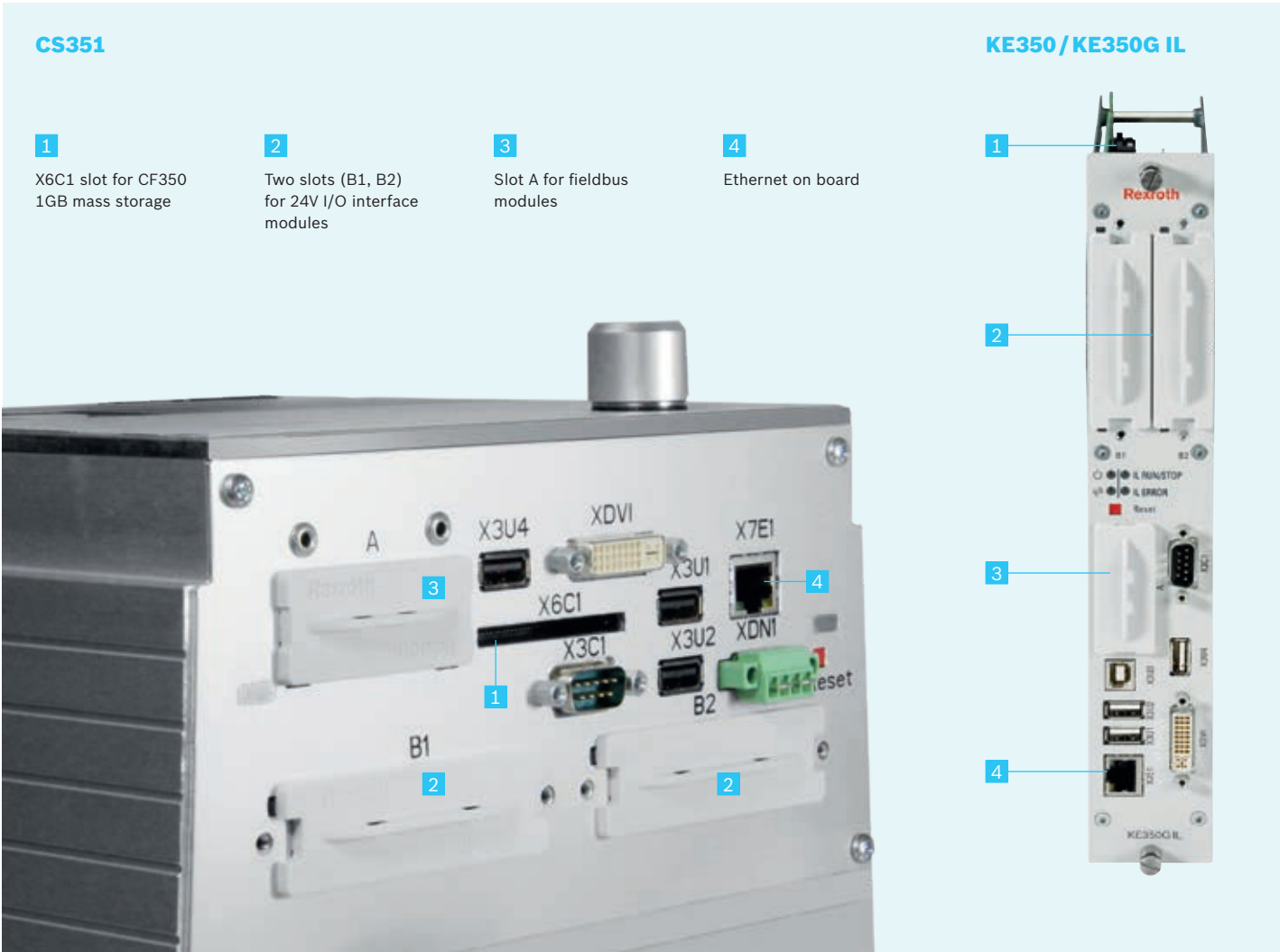


Open and flexible: Interface modules

The interface modules are the connection between the tightening systems and the process controls. Today, Rexroth offers customers all common standards of fieldbuses such as PROFIBUS and DeviceNet as well as Ethernet-based fieldbus systems.



- ▶ Perfect network connection
- ▶ Connection between the tightening system, and the company's IT
- ▶ All standard fieldbuses
- ▶ Open, modular system concept for future standards












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.

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

Interface modules

	Slot	Fieldbus / designation	Code	Order no.	Description
	A	PROFIBUS DP	IMpdp	0 608 830 266	<ul style="list-style-type: none"> ▶ Data transfer via I/O level, e.g. for PLC functionality ▶ Insertion in the A slot of the KE350... or the CS351... ▶ Occupies a 400 byte address space on the fieldbus, which can be adjusted from 16I/16O points (2 bytes) to 512 I/512O points (128 bytes), as well as 0-64 bytes ID code and 0-242 bytes data ▶ The logical assignment of the control signals is set using the BS350 operating system
	A	DeviceNet	IMdev	0 608 830 267	<ul style="list-style-type: none"> ▶ Data transfer via I/O level, e.g. for PLC functionality ▶ Insertion in the A slot of the KE350... or the CS351... ▶ Occupies a 512 byte address space on the fieldbus, which can be adjusted from 16 I/16O points (4 bytes) to 512 I/512O points (128 bytes), as well as a 0-64 bytes ID code ▶ The logical assignment of the control signals is set using the BS350 operating system
	A	PROFINET IO	IMpnio	0 608 830 272	<ul style="list-style-type: none"> ▶ Complete PROFINET IO interface with IO device function (slave) ▶ Simple data transfer via I/O level ▶ Complies with the real-time classification (RT) of the PROFIBUS user organization
	A	PROFINET IO	IMpnio2	0 608 830 312	<ul style="list-style-type: none"> ▶ Complete PROFINET IO interface with IO device function (slave) ▶ Simple data transfer via I/O level ▶ Complies with the real-time classification (RT) of the PROFIBUS user organization ▶ KE: from 2 to 64 byte I/O, to 254 byte E-data, to 254 byte output data ▶ CS: from 2 to 8 byte I/O, to 64 Byte E-data, to 254 Byte output data ▶ Configurable into byte and multiple byte blocks ▶ Integrated switch for building networks in star, line or ring topology

	Slot	Fieldbus/ designation	Code	Order no.	Description
	A	EtherCat	IMecat	0 608 830 302	<ul style="list-style-type: none"> ▶ Enables coupling of the tightening system (slave) to EtherCat networks ▶ Data transfer possible via I/O level ▶ integrated switch for building networks in star, line or ring topology
	A	Ethernet/IP	IMenip	0 608 830 271	<ul style="list-style-type: none"> ▶ Complete Ethernet/IP interface with adapter function (slave), includes all analog and digital components of a powerful Ethernet / IP connection ▶ Simple data transfer via I/O level ▶ Certified module tested for interoperability with leading Ethernet/IP scanner modules
	A	Ethernet/IP	IMenip2	0 608 830 313	<ul style="list-style-type: none"> ▶ Simple data transfer via I/O level ▶ Support for transfer rates of 10 Mbps or 100 Mbps ▶ The interface is designed as an 8-pin RJ45 socket ▶ Use of connector according to IEC 61158 ▶ Integrated switch for building networks in star, line or ring topology ▶ the LED NS shows status of the Ethernet ▶ Power is supplied directly through components of System 350
	A	Modbus TCP	IMmtcp	0 608 830 273	<ul style="list-style-type: none"> ▶ Complete ModbusTCP interface with server function (slave) ▶ Includes all analog and digital components of a powerful ModbusTCP interface connection ▶ Simple data transfer via I/O level
	B	24V I/O interface	IM24V	0 608 830 259	<ul style="list-style-type: none"> ▶ Enables control over the tightening system and output of 24 V status signals via a 24 V interface ▶ Insertion in a corresponding slot on the KE350 or KE350G IL or the SE352M control unit ▶ Provides 10 inputs and 13 outputs. The outputs are short circuit-proof and protected against reverse polarity ▶ Complies with DIN 19240

Rexroth cables: consistent, digital data 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 always error-free. This is why the tightening systems from Rexroth are equipped with fully digital data communication.

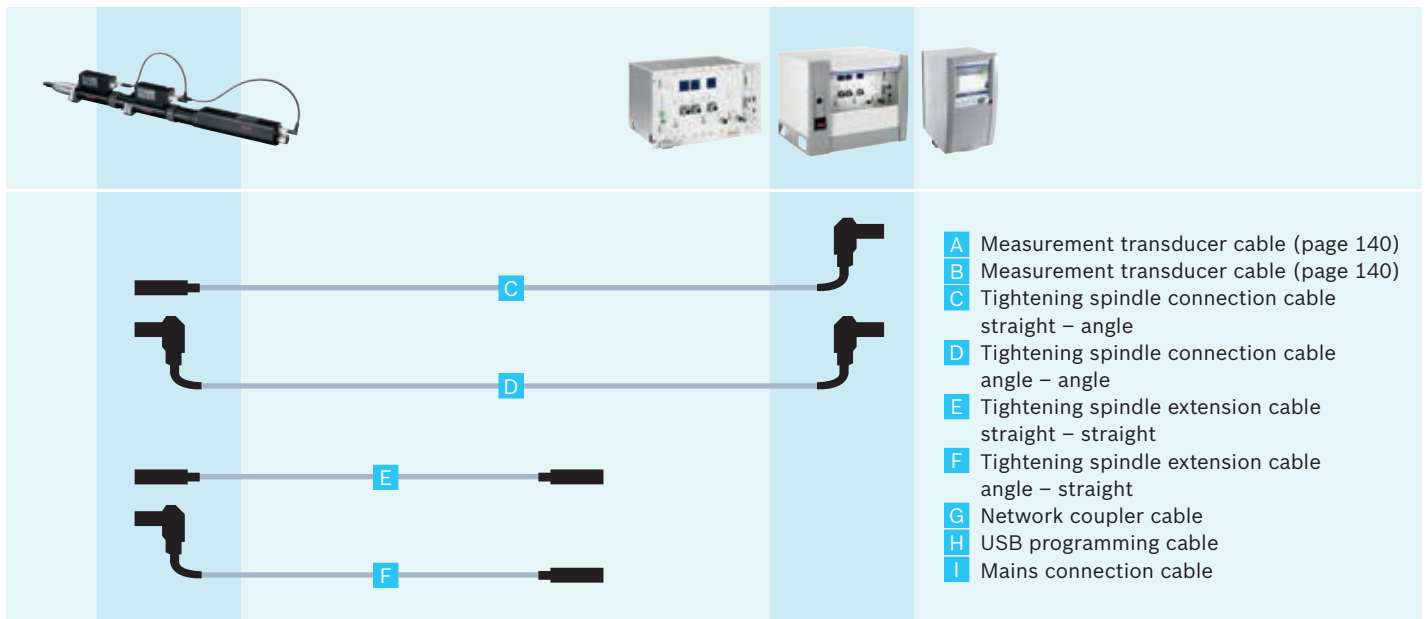
- ▶ Secure and reliable data transfer thanks to digital technology
- ▶ Maximum cable length of up to 100 meters enables flexible hall design
- ▶ Connection cables for tightening spindles are suitable for robot use
- ▶ Customer-specific cable lengths available





- ▶ Connection cables for joining tightening spindles with compact or modular systems
- ▶ Connection cables for joining hand-held nutrunners with compact or modular systems
- ▶ Extension cables for extending connection cables of tightening spindles with compact and modular systems
- ▶ Network coupler cables for connecting multiple modular systems
- ▶ Measurement transducer cables for connecting individual components of a tightening spindle
- ▶ USB programming cable for connecting a PC with compact or modular systems
- ▶ Mains connection cables for joining compact systems with a power socket (included in the scope of delivery in Europe)

Cables for tightening spindles with molded connectors

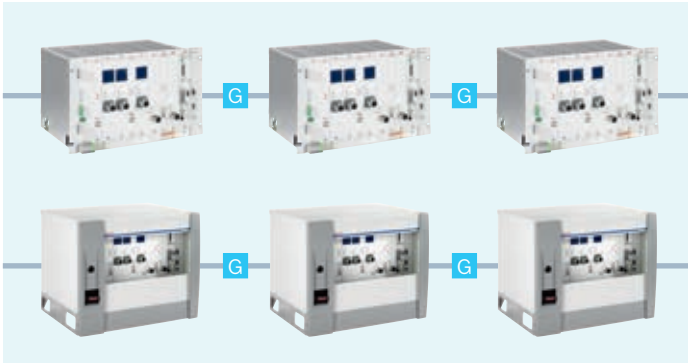


TIGHTENING SPINDLE CONNECTION CABLE

The tightening spindle is connected to the CS351S... Compact System or the LTS350D servo amplifier via a connection cable. Up to 5 extension cables may be connected to the connection cable one after the other in any order. For applications where the tightening spindle is in constant motion, we recommend constructing the connection from several individual parts.

Max. length of the connection cable:

- ▶ When connecting to a system box or card rack: 100 m
- ▶ When connecting to a Compact System: 50 m



CONNECTING CARD RACKS AND SYSTEM BOXES

The network coupler cables connect individual BT356 card racks and SB356 system boxes. 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 total length of all network coupler cables may not exceed 150 m. Network coupler cables are not extendable.

NOTE

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

	Code	Order no.	Length m	Weight kg
C	S-003-S-A	0608 740 100	3	1.015
	S-005-S-A	0608 740 101	5	1.495
	S-007-S-A	0608 740 102	7	1.975
	S-010-S-A	0608 740 103	10	2.695
	S-015-S-A	0608 740 104	15	3.895
	S-020-S-A	0608 740 105	20	5.095
	S-FREE-S-A*	0608 741 100	>0.5	-
	D	S-003-A-A	0608 740 110	3
S-005-A-A		0608 740 111	5	1.540
S-007-A-A		0608 740 112	7	2.020
S-010-A-A		0608 740 113	10	2.740
S-015-A-A		0608 740 114	15	3.940
S-FREE-A-A*		0608 741 110	>0.5	-
E		S-EXT-003-S-S	0608 740 120	3
	S-EXT-005-S-S	0608 740 121	5	1.450
	S-EXT-007-S-S	0608 740 122	7	1.930
	S-EXT-010-S-S	0608 740 123	10	2.650
	S-EXT-015-S-S	0608 740 124	15	3.850
	S-EXT-020-S-S	0608 740 125	20	5.050
	S-EXT-FREE-S-S*	0608 741 120	>0.5	-
	F	S-EXT-003-A-S	0608 740 130	3
S-EXT-005-A-S		0608 740 131	5	1.495
S-EXT-007-A-S		0608 740 132	7	1.975
S-EXT-010-A-S		0608 740 133	10	2.695
S-EXT-FREE-A-S*		0608 741 130	>0.5	-

	Code	Order no.	Length m	Weight kg
G	NKL0.6	3 608 877 369	0.6	-
	NKL002	3 608 877 370	2	-
	NKL003	3 608 879 240	3	-
	NKL005	3 608 877 371	5	-
	NKL010	3 608 877 372	10	-
	NKLF*	3 608 877 373 / ...	>0.5	-
	H	USB350	3 608 877 427	3
I		CS351USC (110V)**	3 608 877 033	1.8

* The connection cables S-FREE-S-A [C], S-FREE-A-A [D] as well as extension cables S-EXT-FREE-S-S [E], S-EXT-FREE-A-S [F] and the network coupler cable NKLF [G] require a length specification in addition to the part number. The "FREE" in the code stands for flexible cable lengths in 0.25-m increments. The length and order number must both be indicated on your order.

Ordering example: Connection cable [C] 17.75 m long is S-FREE-S-A 0 608 741 100 /17.75

Calculation of the weight for free lengths:

Weight of cable: 240 g/m
Weight angle plug: 170 g
Weight straight plug: 125 g

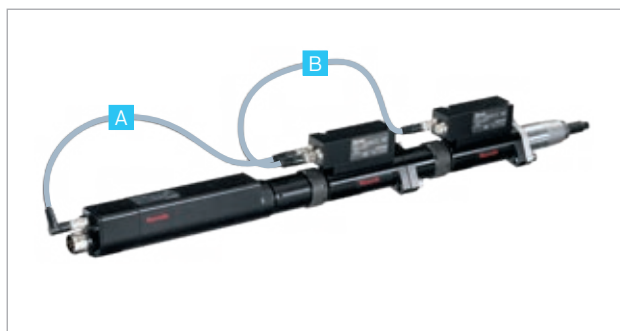
** Mains connection cable USA (The mains connection cable is included in the standard scope of delivery for Europe.)

Measurement transducer cables



TIGHTENING SPINDLE WITH SPINDLE BEARING, OFFSET OUTPUT DRIVE, OR ANGLE HEAD

Size	A	Code	Order no.
2		MC038	0 608 730 100
3		MC038	0 608 730 100
4		MC046	0 608 730 101
5		MC061	0 608 730 103
5	With blocking adapter	MC072	0 608 730 104



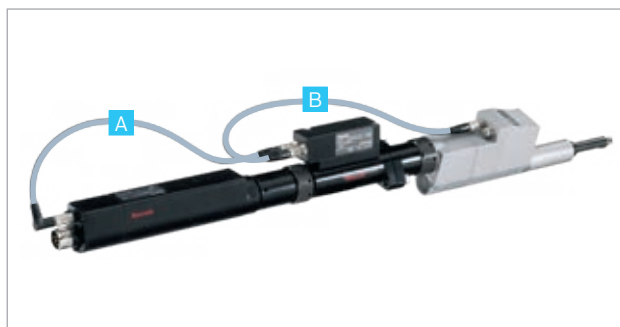
TIGHTENING SPINDLE WITH SPINDLE BEARING, OFFSET OUTPUT DRIVE OR ANGLE HEAD AND REDUNDANT MEASUREMENT TRANSDUCER

Size	A	Code	Order no.	B	Code	Order no.
2		MC038	0 608 730 100		MCR033	0 608 730 200
3		MC038	0 608 730 100		MCR033	0 608 730 200
4		MC046	0 608 730 101		MCR033	0 608 730 200
5		MC061	0 608 730 103		MCR040	0 608 730 201



TIGHTENING SPINDLE WITH OFFSET OUTPUT DRIVE WITH INTEGRATED MEASUREMENT TRANSDUCER

Size	VMC	A	Code	Order no.
3	3VMC0..		MC046	0 608 730 101
4	4VMC150		MC055	0 608 730 102
4	4VMC210		MC055	0 608 730 102
4	4VMC360		MC061	0 608 730 103



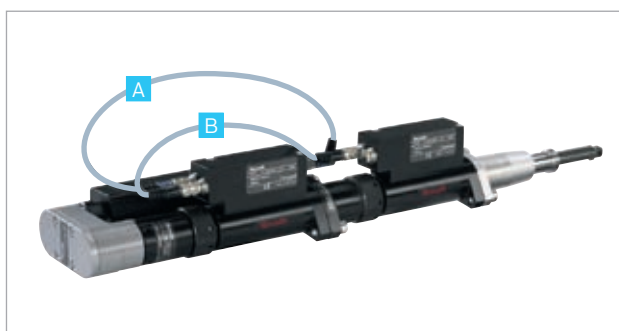
TIGHTENING SPINDLE WITH OFFSET OUTPUT DRIVE WITH INTEGRATED MEASUREMENT TRANSDUCER AND REDUNDANT MEASUREMENT TRANSDUCER

Size	VMC	A	Code	Order no.	B	Code	Order no.
3	3VMC0..		MC038	0 608 730 100		MCR045	0 608 730 202
4	4VMC150		MC046	0 608 730 101		MCR040	0 608 730 201
4	4VMC210		MC046	0 608 730 101		MCR040	0 608 730 201
4	4VMC360		MC046	0 608 730 101		MCR045	0 608 730 202



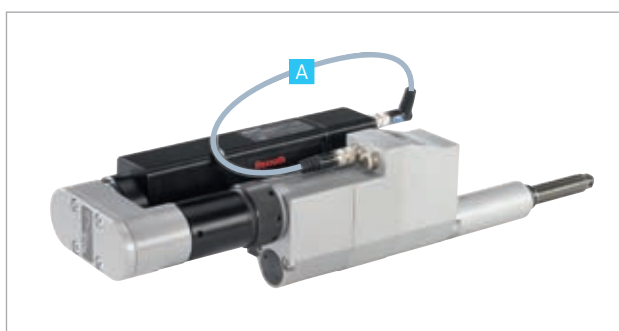
TIGHTENING SPINDLE WITH TRANSVERSE GEARBOX

Size	A	Code	Order no.
2		MC046	0 608 730 101
3		MC046	0 608 730 101
4		MC046	0 608 730 101
5		MC061	0 608 730 103



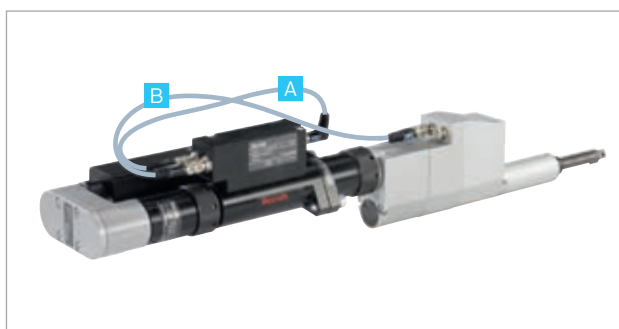
TIGHTENING SPINDLE WITH TRANSVERSE GEARBOX AND REDUNDANT MEASUREMENT TRANSDUCER

Size	A	Code	Order no.	B	Code	Order no.
2		MC046	0 608 730 101		MCR033	0 608 730 200
3		MC046	0 608 730 101		MCR033	0 608 730 200
4		MC046	0 608 730 101		MCR033	0 608 730 200
5		MC061	0 608 730 103		MCR040	0 608 730 201



TIGHTENING SPINDLE WITH OFFSET OUTPUT DRIVE WITH INTEGRATED MEASUREMENT TRANSDUCER AND TRANSVERSE GEARBOX

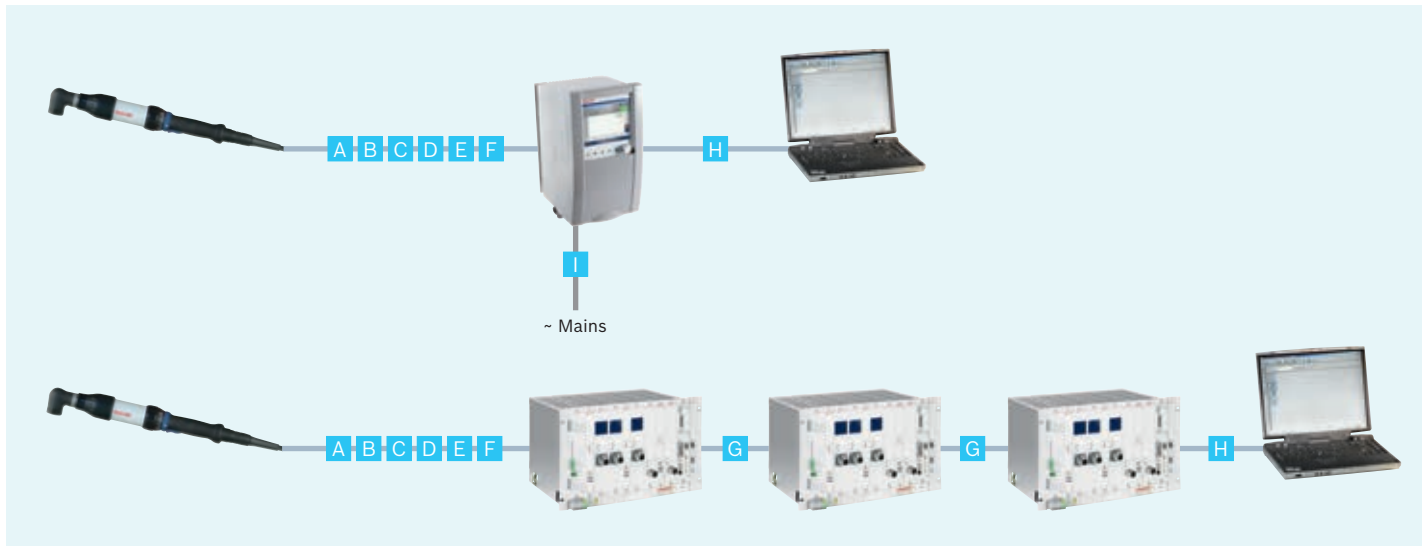
Size	VMC	A	Code	Order no.
3	3VMC0..		MC038	0 608 730 100
4	4VMC150		MC038	0 608 730 100
4	4VMC210		MC038	0 608 730 100
4	4VMC360		MC038	0 608 730 100



TIGHTENING SPINDLE WITH OFFSET OUTPUT DRIVE WITH INTEGRATED MEASUREMENT TRANSDUCER AND TRANSVERSE GEARBOX AND REDUNDANT MEASUREMENT TRANSDUCER

Size	VMC	A	Code	Order no.	B	Code	Order no.
3	3VMC0..		MC038	0 608 730 100		MCR045	0 608 730 202
4	4VMC150		MC038	0 608 730 100		MCR040	0 608 730 201
4	4VMC210		MC038	0 608 730 100		MCR040	0 608 730 201
4	4VMC360		MC038	0 608 730 100		MCR045	0 608 730 202

Cables for ErgoSpin hand-held nutrunners with molded connectors

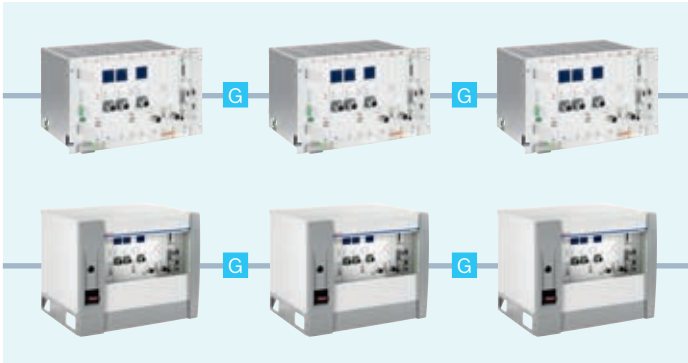


* Connection cable S-A with extra-long bend relief on request

ERGOSPIN CONNECTION CABLE

The ErgoSpin hand-held nutrunner is connected to the CS351E... Compact System or the LTE350D servo amplifier via a connection cable. Up to 5 of the connection cables listed at the side may be connected one after the other in any order. For applications where the hand-held nutrunner is in constant motion, we recommend constructing the connection from several individual parts.

- Max. length of the connection cable:
- ▶ When connecting to a system box or card rack: 100 m
 - ▶ When connecting to a Compact System: 50 m



CONNECTING CARD RACKS AND SYSTEM BOXES

The network coupler cables connect individual BT356 card racks and SB356 system boxes. 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 total length of all network coupler cables may not exceed 150 m. Network coupler cables are not extendable.

NOTE

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

	Code	Order no.	Length m	Weight kg
A	E-003-S-A	0608 740 200	3	1.015
	E-005-S-A	0608 740 201	5	1.495
	E-007-S-A	0608 740 202	7	1.975
	E-010-S-A	0608 740 203	10	2.695
	E-015-S-A	0608 740 204	15	3.895
	E-020-S-A	0608 740 205	20	5.095
	E-FREE-S-A*	0608 741 200	>0.5	-
B	E-003-A-A	0608 740 210	3	1.06
	E-005-A-A	0608 740 211	5	1.54
	E-007-A-A	0608 740 212	7	2.02
	E-010-A-A	0608 740 213	10	2.74
	E-FREE-A-A*	0608 741 210	>0.5	-
C	E-003-S-S	0608 740 220	3	0.97
	E-005-S-S	0608 740 221	5	1.45
	E-007-S-S	0608 740 222	7	1.93
	E-010-S-S	0608 740 223	10	2.65
	E-FREE-S-S*	0608 741 220	>0.5	-
D	E-003-A-S	0608 740 230	3	1.015
	E-005-A-S	0608 740 231	5	1.495
	E-007-A-S	0608 740 232	7	1.975
	E-010-A-S	0608 740 233	10	2.695
E-FREE-A-S*	0608 741 230	>0.5	-	
E	E-003-ROT-A-S	0608 740 240	3	1.07
	E-005-ROT-A-S	0608 740 241	5	1.55
	E-007-ROT-A-S	0608 740 242	7	2.03
	E-010-ROT-A-S	0608 740 243	10	2.75
	E-FREE-ROT-A-S*	0608 741 240	>0.5	-

	Code	Order no.	Length m	Weight kg
F	E-003-ROT-A-A	0608 740 250	3	1.115
	E-005-ROT-A-A	0608 740 251	5	1.595
	E-007-ROT-A-A	0608 740 252	7	2.075
	E-010-ROT-A-A	0608 740 253	10	2.795
	E-FREE-ROT-A-A*	0608 741 250	>0.5	-
G	NKL0.6	3608 877 369	0.6	-
	NKL002	3608 877 370	2	-
	NKL003	3608 879 240	3	-
	NKL005	3608 877 371	5	-
	NKL010	3608 877 372	10	-
	NKLF*	3608 877 373 / ...	>0.5	-
H	USB350	3608 877 427	3	-
I	CS351USC (110V)**	3608 877 033	1.8	-

* The connection cables E-FREE-S-A [A], E-FREE-A-A [B], E-FREE-S-S [C], E-FREE-A-S [D], E-FREE-ROT-A-S [E], E-FREE-ROT-A-A [F] and NKLF [G] require a length specification in addition to the part number. The "FREE" in the code stands for flexible cable lengths in 0.25-m increments. The length and order number must both be indicated on your order.

Ordering example: Connection cable [A] 17.75 m long is
E-FREE-S-A 0 608 741 200 / 17.75

Calculation of the weight for free lengths:

Weight of cable: 240 g/m
Weight angle plug: 170 g
Weight freely rotatable angle plug: 225 g
Weight straight plug: 125 g

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