

NC Joining Module NCFR

Type 2161A...

For Joining Processes and Rotational Movement

The NC joining module NCFR Type 2161A..., consisting of two hollow-shaft motors and integrated sensors measuring force, displacement, crank angle, and torque (optional), is well-suited for use in monitored assembly and joining processes where rotary movements are involved in combination with linear movements.

- Compact design thanks to hollow-shaft motors
- Axial forces of up to 15 kN, torque of up to 50 N·m
- Maximum dynamic thanks to cutting-edge drive technology
- High speed of travel with up to 400 mm/s
- Absolute encoder for displacement and crank angle
- Optional torque sensor including amplifier

Description

Boasting integrated hollow-shaft servo motors, NC joining modules NCFR Type 2161A... set themselves apart with their compact dimensions and exceptionally low weight. This design affords both drives maximum dynamics and fully independent linear and rotational movements.

The drive motors are electrically commutated, hollow-shaft AC servo motors which are controlled by two servo controllers. Constant rotation speed, i.e. constant motion speed is guaranteed. Standard functions, such as block pressing, position pressing and force feedback controlled pressing, as well as intermediate positioning and rotation by signal, angle, torque and even torque control, are supported. The activation of the servo controllers and the analysis of the piezoelectric force sensor and the strain gauge torque sensor for both crank angle and displacement are handled by the XY monitor maXYmos NC.

The NC joining module NCFR is operated with IndraDrive servo controllers, in combination with maXYmos NC Type 5847B1. The communication between the servo controllers and maXYmos NC is done in real-time via SERCOS III. Several field bus slave interfaces are available onboard for customer provided controlling. PROFIBUS, PROFINET, EtherNet/IP or even EtherCAT can be used with the maXYmos NC according to the customer's selection. Quality data can be transmitted via the Ethernet interface by different protocols and a visualization via VNC® or a data backup can be performed.



Application

The NC joining module NCFR Type 2161A... is well-suited for use as a linear actuator, as well as rotational movements during assembly and joining tasks in automatic production systems.

The installation is possible both vertically and horizontally. Fixation of the joining units at a machine frame is provided through flange mounting. Tapped holes for a tool receptacle are available at the plunger (Fig. 1).

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Technical Data

Dimensions	mm	Fig. 1
Assembly options		flange assembly
Weight	kg	31
Max. tool weight ¹⁾	kg	25 ⁶⁾
Direction of measurement		compression/tension
Measuring range	kN	5, 15
Displacement sensor system - linear		absolute encoder
Resolution - linear	mm	0,001
Practical repeatability	mm	0,01
Length of stroke	mm	400
Tool holder	mm	Fig. 1
Holding brake - linear	V/A	24/1
Holding brake - rotation	V/A	24/1
Max. movement speed	mm/s	400 ⁴⁾
Force sensor		piezoelectric
Linearity in all ranges	%FSO	≤1
Accuracy class force sensor	%	0,5

¹⁾ Possible radial forces have to be avoided independantly of the mounting orientation.

⁴⁾ In dependance on the speeds this may reduce when operating simultaneously. Additional reduction of the speeds may be necessary in dependance of the tool weight.
For horizontal mounting and max. 250 min⁻¹ are max. 5 kg permissible.

In case of horizontal mounting the bending of the ram in dependance of the tool weight must be considered. The tool weight must be reduced.

Torque		
Peak torque	N·m	50
Maximum speed	min ⁻¹	1 000 ⁴⁾
Max. number of revolutions	R/absolute	80
Resolution - rotation	°	0,01
Torque sensor		Strain gage
Linearity - torque	%FSO	<1,5
Operating life of spindle (according to defined drive profile)	cycles	approx. 10 million
Short stroke	mm	≤60
Lubrication connection (exterior)		standard lubricating nipple
Temperature range	°C	10 ... 40
Protection class		IP54

Servo Amplifier^{2) 5)} Bosch-Rexroth Type 2180A...
Standard interface SERCOS III (internal bus)

Evaluation Unit³⁾ maXYmos NC Type 5847...
Standard interface PROFIBUS, PROFINET, EtherNet/IP, EtherCAT
Power supply VDC 24 ±5 %

²⁾ Servo amplifier, see data sheet 003-125 Type 2180A...

³⁾ Evaluation unit maXYmos NC Type 5847B... see data sheet 003-272

⁵⁾ Safety function SMES

⁶⁾ Max. moment of inertia 0,25 kg·m² /Balance quality of tool: 6.3

Dimensions NC Joining Module NCFR

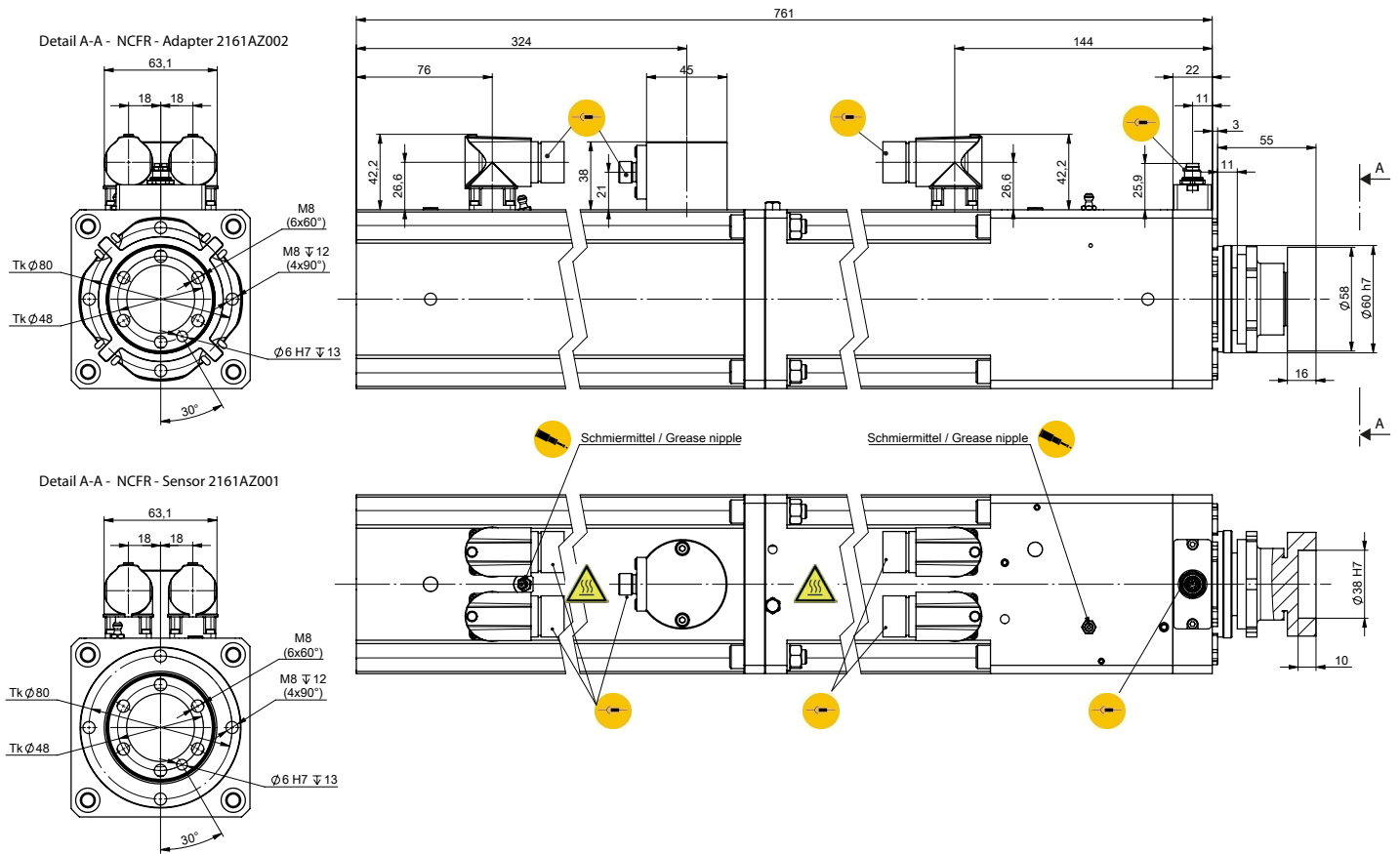


Fig. 1: Dimension NC Joining Module NCFR Type 2161A...

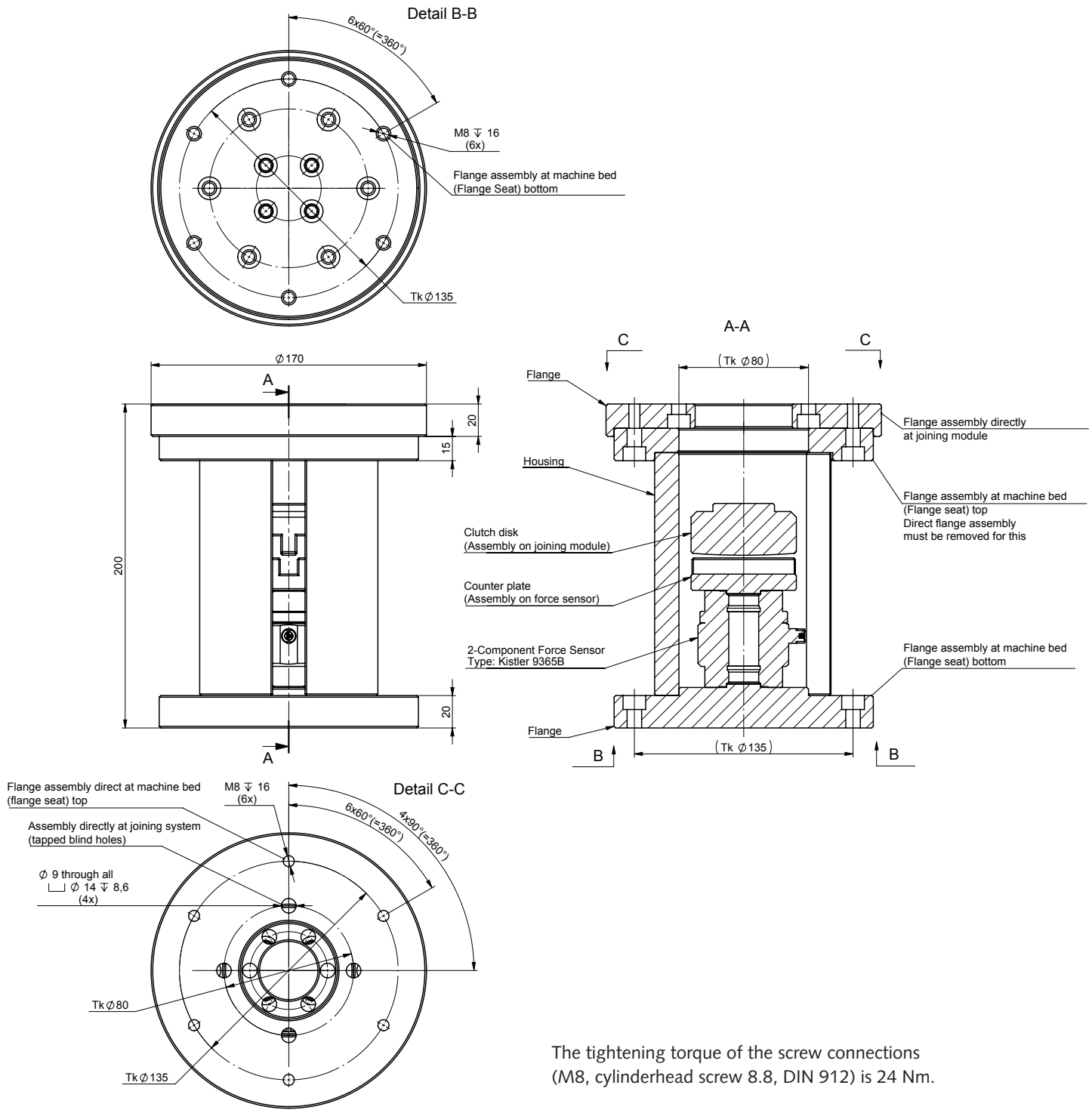
The radial forces (due to the weight of the tool, for example) must be considered for the installation. An external guide may have to be provided for the ram.

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Warnings and Notes:

- Lubrication points
- Electrical connection points
- Warning high temperatures
- Attachment points

Calibration Device with Mounting Holes



The tightening torque of the screw connections (M8, cylinderhead screw 8.8, DIN 912) is 24 Nm.

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Functional Principle with maXYmos NC Type 5847...

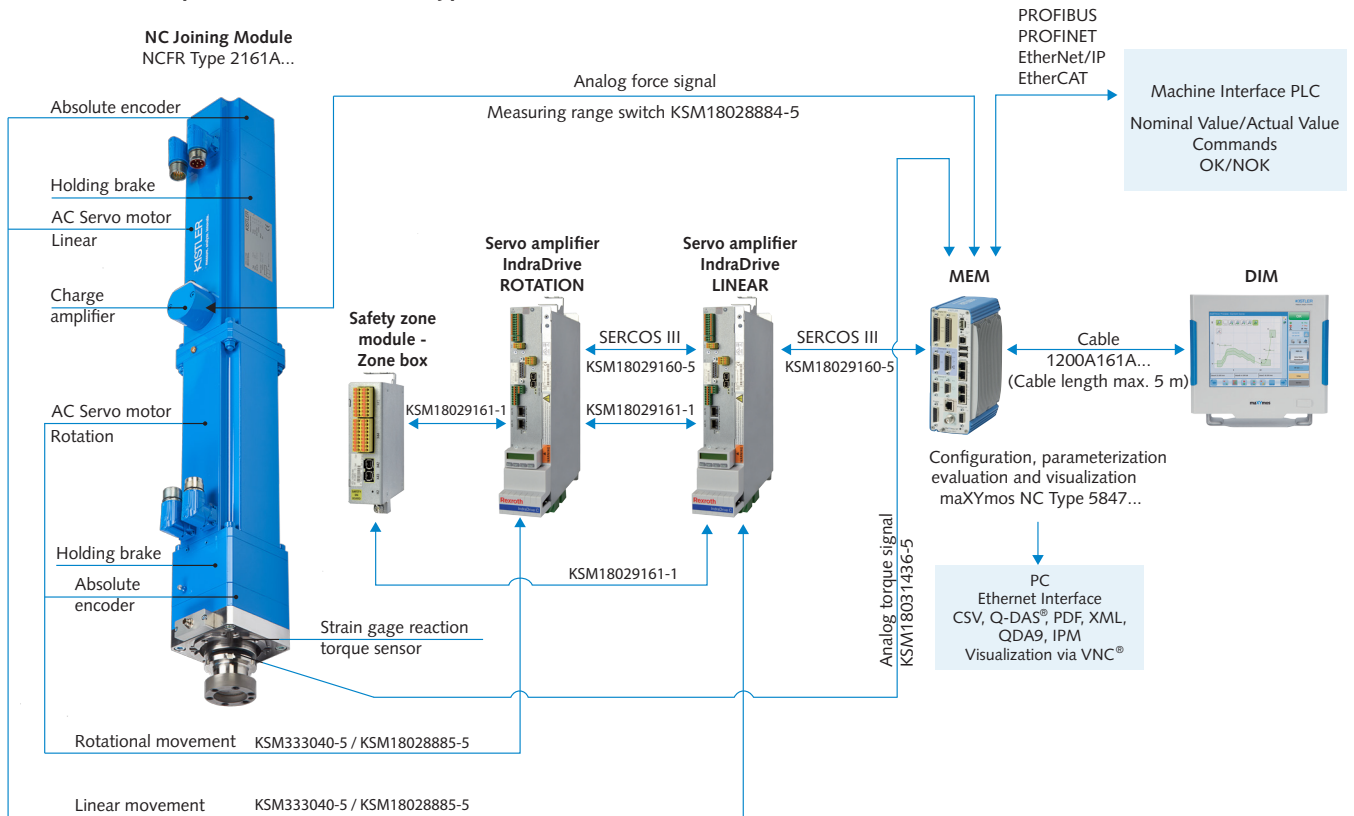


Fig. 2: Functional principle of NC joining system with NC joining module NCFR Type 2161A... and maXYmos NC Type 5847...

Included Accessories

- None

Optional Accessories

Optional Accessories	Type/Art. No.
• Evaluation unit maXYmos NC ¹⁾ (MEM)	5847B1
• NCFR Firmware Version (only for re-order)	2836A
• Display module (DIM) with pedestal	5877AZ000
• Connection cable maXYmos MEM on DIM, length 5 m	1200A161A5
• Servo amplifier ²⁾	2180A...
• DIM Cable Extender	1200A163
• Mounting rail adapter for 35 mm cap rail including 2 fastening screws M3x10	5700A31
• Torque Sensor	2161AZ001
• Adapter Flange	2161AZ002

¹⁾ Evaluation unit maXYmos NC Type 5847B... see data sheet 003-272

²⁾ Servo amplifier Type 2180A... see data sheet 003-125

Cable

Cable	Type/Art. No.
• NCFH motor cable, (2 cables required), length 5 m	KSM333040-5
• NCFH feedback cable, (2 cables required), length 5 m	KSM18028885-5
• maXYmos force transmitter cable, length 5 m	KSM18028884-5
• SERCOS III connection cable, (2 cables required), length 5 m	KSM18029160-5
• Safety zone box cable, (3 cables required), length 1 m	KSM18029161-1
• maXYmos torque transmitter cable, length 5 m	KSM18031436-5

Additional lengths available upon request.

Ordering Key Servo Amplifier for NCFR

Power section for NC joining module		Type 2180A <input type="checkbox"/>
NCFR	2161A - Linear	NCFR1LSB ⁵⁾
NCFR	2161A - Rotation	NCFR1R00 ⁵⁾

⁵⁾ Safety function SMES

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Application Example

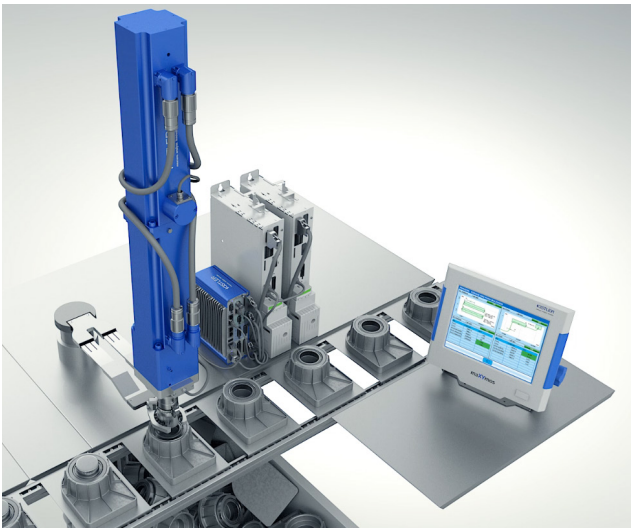


Fig. 3: Application example for joining process with NCFR and maXYmos NC

Ordering Key

Measuring Range

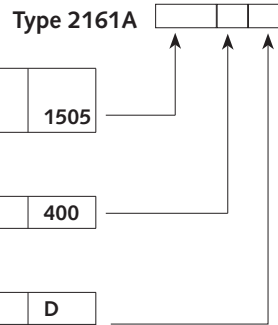
Measuring range 1: 15 kN	1505
Measuring range 2: 5 kN	

Stroke

400 mm	400
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Sensor

Torque sensor Type 2161AZ001	D
Adapter flange Type 2161AZ002	A



Ordering Example

Type 2161A1505400D

NC joining module NCFR **Type 2161A...**, measuring range 1: 15 kN, measuring range 2: 5 kN: **1505**, stroke: **400 mm**, sensor: torque sensor: **D**