NC Joining Module NCFT for Joining Operation with Single-Channel Control Systems

The NC joining module NCFT Type 2157A... with integrated piezoelectric force sensor for two predefined measuring ranges of 0,25 ... 1 kN is excellent for use in assembly and joining processes monitored by force displacement.

- Force feedback control
- Integrated Piezo charge amplifier
- High measuring accuracy in two ranges
- High velocity
- Practical repeatability <0.005 mm
- Active compensation of process compression for exact positioning
- High overload capacity up to 15x
- No external PC with special software required
- Absolute encoder, eliminates reference point determination
- Low maintenance

Description
The NC joining modules NCFT Type 2157A... consist of a robust housing with an integral piezoelectric tension/compression force sensor. An absolute encoder for precise positioning is integrated in the drive motor. The compressive or tension forces affecting the sensor create a proportional electrical charge in the piezoelectric measuring element, which is converted into an analog voltage signal by the integrated charge amplifier. The drive motor is an electrically commutated AC servo motor which is controlled by a servo controller. This servo controller provides constant speed independent of load.

Standard functions like block pressing, position pressing and force feedback controlled pressing as well as intermediate positioning are supported.

The NC joining module NCFT can be operated with the IndraDrive servo controller in combination with the DMF-P A300 NCF Type 4734A..., DMF-P A310 Universal Type 4740A... or with the NC Compact Type 2159A. Monitoring of the work area of the screw drive is assumed the electronics in the servo controller.

The functional principle of the individual systems is described on the following pages. A field bus slave interface is used to connect the system to the system control, the Ethernet connection, including output of QA data.

Application
NC joining module NCFT Type 2157A... is excellent for applications in assembly and joining tasks in automated production plants and manual-work places. The compact dimensions, slim design and low joining forces are best suited for precision mechanical fabrication as for example in watch, clock and small-power motor industry.

Vertical and horizontal installation is possible and is performed by wall or flange assembly. Process tooling may be installed on the ram (Fig. 1).
Technical Data

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>mm</th>
<th>Fig. 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembly options</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>5,8</td>
</tr>
<tr>
<td>Max. tool weight*</td>
<td>kg</td>
<td>5</td>
</tr>
<tr>
<td>Direction of measurement</td>
<td></td>
<td>tension/compression</td>
</tr>
<tr>
<td>Measuring range</td>
<td>kN</td>
<td>0,25, 0,5, 1</td>
</tr>
<tr>
<td>Length of stroke</td>
<td>mm</td>
<td>100</td>
</tr>
<tr>
<td>Tool holder</td>
<td>mm</td>
<td>Fig. 1</td>
</tr>
<tr>
<td>Holding brake</td>
<td>V/A</td>
<td>24/0,4</td>
</tr>
<tr>
<td>Max. movement speed</td>
<td>mm/s</td>
<td>300</td>
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<tr>
<td>Displacement sensor system</td>
<td>absolute encoder</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>µm</td>
<td>0,5</td>
</tr>
<tr>
<td>Force sensor</td>
<td></td>
<td>piezoelectric</td>
</tr>
<tr>
<td>Temperature range</td>
<td>°C</td>
<td>10 ... 40</td>
</tr>
<tr>
<td>Protection class</td>
<td></td>
<td>IP54</td>
</tr>
<tr>
<td>Linearity in all ranges</td>
<td>%FSO</td>
<td>≤1</td>
</tr>
<tr>
<td>Service life of spindle (acc. to defined drive profile)</td>
<td>cycles</td>
<td>approx. 10 million</td>
</tr>
</tbody>
</table>

* Possible radial forces must be considered independent of the mounting.

Short stroke mm ≤60
Central lubrication connection (exterior) standard-lubricating nipple

Servo Controller Bosch-Rexroth Type IndraDrive
Standard Interface** Profibus
Power connection VDC/W 24 (19,2 ... 28,8) /24
Power connection V 400 (400 ... 500) ±10 %
Hz 50/60 ±2 %
phase 3

Evaluation Unit Type 4734A... or Type 4740A...
Standard Interface Profibus
Power supply VDC 24 ±10 %

Evaluation Unit
NC Compact Firmware Type 2159A
Operating Panel Type 2158A

Assembly may require an external guidance for the roller screw. Radial forces such as tool weight must be considered.
Functional Principle with DMF-P A300 NCF Type 4734A...

NC Joining Module NCFT Type 2157A...

Fig. 2  Functional principal of NC joining system with NC joining module NCFT Type 2157A... and DMF-P A300 NCF Type 4734A...

Included Accessories
- None

Optional Accessories
- Servo controller for Type 2157A... with integrated safety option
  IndraDrive 12 A PB S2 MPH07
- Evaluation unit DMF-P A300 NCF
- Wall housing evaluation unit
- Desktop housing evaluation unit
- Panel housing evaluation unit

Type/Art. No.

Cable
- NCFT motor cable, length 5 m RKL4302
- NCFT MSK Feedback cable, length 5 m RKG4200
- NCF cable SSI displacement
  IndraDrive, length 5 m
- Data cable IndraDrive, length 5 m
- NCF cable force transmitter, length 5 m
- NCF cable analog force signal, length 5 m
- NCF cable XTE, YTE
  IndraDrive, length 5 m

Typ/Art. Nr.
KSM315330-5
KSM303500-5
KSM301750-5
KSM301640-5
KSM313720-5
KSM301760-5
KSM314030-5

Other length on request.
Functional Principle with DMF-P A310 Universal Type 4740A...

Fig. 3: Functional principle of NC joining system with NC joining module NCFT Type 2157A... and DMF-P A310 Universal Type 4740A...

Included Accessories
- None

Optional Accessories
- Servo controller IndraDrive 12 A El S2 MPC07, NCFT 1 kN KSM036432
- Evaluation unit DMF-P A310 Universal 4740A...
- Wall housing evaluation unit 4740AWY2...
- Desktop housing evaluation unit 4740ATY2...
- Panel housing evaluation unit 4740AEY2...

Cable
- NCFT motor cable, length 5 m RKL4302 KSM315330-5
- NCFT MSK Feedback cable, length 5 m RKG4200 KSM303500-5
- NCF cable force transmitter, length 5 m KSM313720-5
- Network cable A310 EtherNet/IP, length 5 m KSM036457-5
- Network cable A310 EtherNet/IP, length 10 m KSM036458-10
- Network cable A310 EtherNet/IP, length 20 m KSM036459-20
- Network cable A310 EtherNet/IP, length 30 m KSM036460-30

Other length on request.
Functional Principle with NC Compact

Included Accessories
- None

Optional Accessories
- Servo controller for Type 2157A...
  with integrated safety option IndraDrive 12A PB S2 MPH07 KSM035366
- NC Compact Firmware 2159A
- NC Compact Operating Panel 2158A

Cable
- NCFT motor cable, length 5 m RKL4302 KSM315330-5
- NCFT MSK Feedback cable, length 5 m RKG4200 KSM303500-5
- Data cable IndraDrive, length 5 m KSM301640-5
- NCF cable force transmitter, length 5 m (NC Compact) KSM313710-5

Other length on request.

Note:
Other Fieldbus Interfaces e.g. EtherNet/IP, Profinet, etc. on request.
Application Example

Fig. 5: Application example for the watch-and-clock industry

Fig. 6: Detail view

Ordering Key

<table>
<thead>
<tr>
<th>Meas. range 1</th>
<th>Meas. range 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,5 kN</td>
<td>0,25 kN</td>
</tr>
<tr>
<td>1 kN</td>
<td>0,25 kN</td>
</tr>
<tr>
<td>1 kN</td>
<td>0,5 kN</td>
</tr>
</tbody>
</table>

Ordering example

NC joining module NCFT Type 2157A..., measuring range 1: 1 kN, measuring range 2: 0,25 kN, choice: 2