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# NC Joining Module NCFL

## For simple, cost-sensitive joining processes

**Type 2167B...**




The NC joining module NCFL Type 2167B... with integrated strain gauge force sensor is available in eleven sizes, covering the force range from 10 ... 100 kN. The NCFL family is extremely suitable for force-displacement monitored assembly and joining processes, typically as a replacement of hydro-pneumatic or hydraulic systems.

- Cost-effective design
- 200 ... 800 mm Stroke
- Measuring direction push
- Compact dimensions
- Uniform operating philosophy using maXYmos NC
- Servo Driver with safe torque off (STO)

**Description**

The NC joining modules NCFL Type 2167B... consist of a housing in which a strain gauge force sensor is integrated. The motion happens by means of a threaded spindle driven via belt respectively a gearbox by a motor. This motor has an absolute encoder for the exact positioning. The drive motor is an electronically commutated AC servodrive controlled by a servo amplifier. Constant revolution speed and therefore constant motion speed is ensured. Standard functions such as block pressing, position pressing and force feedback controlled pressing as well as intermediate positioning are supported.

The NC joining module NCFL can be operated with the ctrlX XC20 servo amplifier in combination with maXYmos NC Type 5847C... . The communication between ctrlX XC20 servo amplifier and maXYmos NC is done in real time via EtherCat (SoE). Several fieldbus slave interfaces or digital I/O are available onboard for customer provided controlling. PROFIBUS, PROFINET, EtherNet/IP or even EtherCAT can be used with the maXYmos NC depending on customer's demands. Quality data can be transferred via the Ethernet interface with several protocols as well as a visualisation by VNC® or a data backup can be done.

The new series now features safe torque off (STO) as a standard function across the entire product range. This enables machine builders and end users to implement modern safety concepts more easily, simplify system integration, and reduce overall engineering effort while ensuring compliance with current industrial safety requirements.

**Application**

The NC joining module NCFL Type 2167B... is best suitable for use in automatic production systems and for manually controlled workstations with safety doors.
The installation is possible vertically as well as horizontally. Fixation of the joining units at a machine frame is possible through flange mounting. Tapped holes for a tool receptacle are available at the plunger (Page 3).

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## Technical data

| | | |
|---|---|---|
| Dimensions | mm | Page 3 |
| Assembly options | | flange assembly |
| Weight | kg | see table of dimensions |
| Direction of measurement | | compression |
| Nominal joining force | kN | 10, 20, 40, 80, 100 |
| Length of stroke | mm | 200, 400, 600, 800 |
| Practical repeatability | mm | 0.01 [3] |
| Non-rotating tool holder | | Fig. 1 |
| Max. tool weight 10/20 kN | | |
| with holding brake [1] | kg | 50 |
| Max. tool weight 40/80/100 kN | | |
| with holding brake [1] | kg | 100 |
| Short stroke operation | | |
| Type 2167B010/020 | mm | ≤70 |
| Type 2167B040/080/100 | mm | ≤120 |
| Max. movement speed | | |
| Type 2167B010/020/040 | mm/s | 250 |
| Type 2167B080 | mm/s | 200 |
| Type 2167B100 | mm/s | 150 |

[1] Possible radial forces must be considered independent of the mounting. Permissible tool weight may have to be reduced for manual feed.

A bending of the plunger depending on the tool weight must be considered for a horizontal installation.

| | | |
|---|---|---|
| Displacement sensor system | | absolute encoder |
| Resolution | mm | 0.003 |
| Force sensor | | Strain gauge |
| Temperature range | °C | 10 ... 40 |
| Protection class | | IP54 |
| Linearity in measuring range | %FSO | ≤1 |
| Accuracy class force sensor | % | 0.5 |
| Torsional backlash plunger | ° | ≤1 |
| Service life of spindle (according to defined drive profile) | cycles | 80% nominal joining force approx. 10 million [4]<br>100% nominal joining force approx. 5 million [4] |
| **Evaluation unit** [2] | | maXYmos NC Type 5847C... |
| Standard Interface | | PROFIBUS, PROFINET, EtherNet/IP, EtherCAT, Digital I/O |
| Power supply | VDC | 24 ±5% |
| EtherCat (SoE) | kHz | 4 |

[2] Evaluation unit maXYmos NC Type 5847C... see data sheet 003-757

[3] At thermal steady-state

[4] The service life is application-specific and depends on the nominal joining force and other factors that can influence the service lifetime. Please do not hesitate to contact us if you have further questions

For travel profiles with a total stroke which is ≤ the short stroke, a lubrication stroke (> than the short stroke) must be performed at regular intervals.

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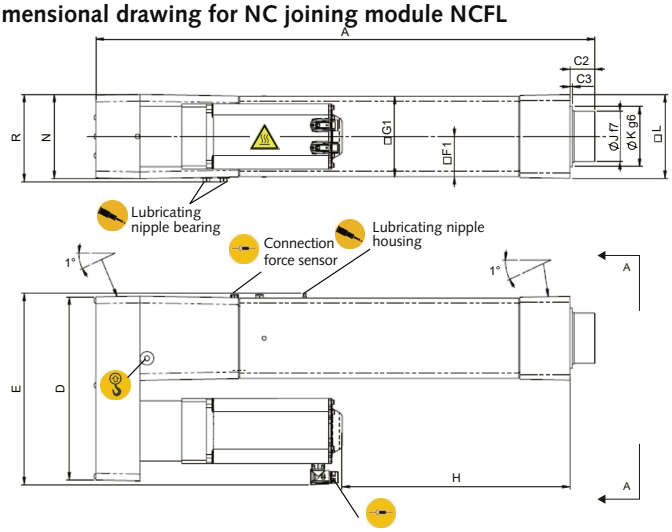


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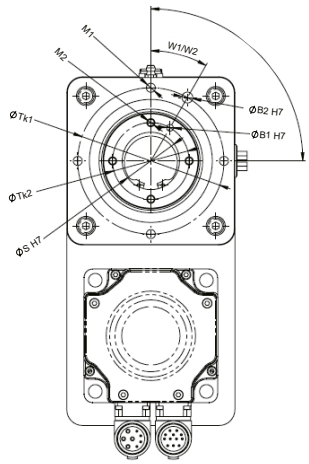
## Dimensional drawing for NC joining module NCFL




Warnings and Notes

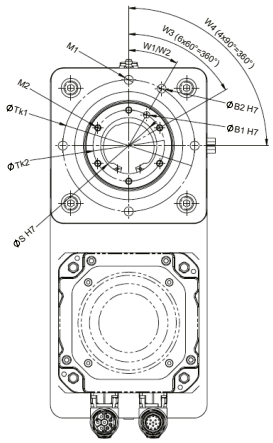
- Lubrication points
- Electrical connection points
- Warning high temperatures
- Attachment points 2x M12x15

| Number Lubrication nipple housing/bearing | | |
|---|---|---|
| kN | Pcs. Housing | Pcs. Bearing |
| 10, 20 | 1 | 1 |
| 40 | 1 | 2 |
| 80 | 1 | 2 |
| 100 | 1 | 1 |

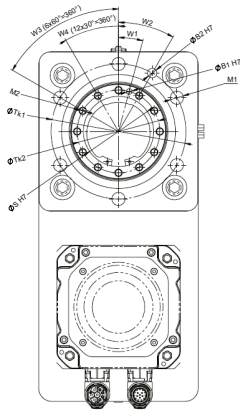



Size 1
A-A view of the NCFL, 10 and 20 kN

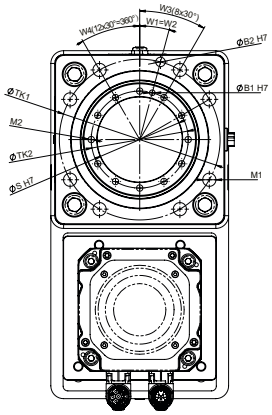
1)Remark: NCFL 10 kN and 20 kN without gearbox.




Size 2
A-A view of the NCFL, 40 kN




Size 3
A-A view of the NCFL, 80 kN




Size 4
A-A view of the NCFL, 100 kN

| Type 2167B ... | Stroke (mm) | A | kg | øJ f7 | øK g6 | □L | C2 | C3 | □G1 | □F1 | N | R | E | D | H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ...010/020... | 200 | 569 | 30 | 70 | 90 | 122.1 | 50 | 5 | 120 | 60 | 123 | 132 | 288 | 253.2 | 243 |
| ...010/020... | 400 | 769 | 38.5 | 70 | 90 | 122.1 | 50 | 5 | 120 | 60 | 123 | 132 | 288 | 253.2 | 443 |
| ...040... | 200 | 719 | 60.5 | 80 | 100 | 143.5 | 50 | 5 | 140 | 70 | 145 | 152.5 | 352 | 322.3 | 218 |
| ...040... | 400 | 919 | 70.5 | 80 | 100 | 143.5 | 50 | 5 | 140 | 70 | 145 | 152.5 | 352 | 322.3 | 418 |
| ...040... | 600 | 1119 | 85 | 80 | 100 | 143.5 | 50 | 5 | 140 | 70 | 145 | 152.5 | 352 | 322.3 | 618 |
| ...080... | 400 | 997 | 104 | 100 | 120 | 167.1 | 50 | 5 | 160 | 80 | 168 | 174 | 382 | 365 | 455 |
| ...080... | 600 | 1197 | 120 | 100 | 120 | 167.1 | 50 | 5 | 160 | 80 | 168 | 174 | 382 | 365 | 655 |
| ...080... | 800 | 1397 | 136 | 100 | 120 | 167.1 | 50 | 5 | 160 | 80 | 168 | 174 | 382 | 365 | 855 |
| ...100... | 400 | 1088 | 158 | 120 | 146 | 180 | 50 | 5 | 180 | 90 | 188 | 194 | 384.2 | 364.9 | 545 |

| Type 2167B ... | Stroke (mm) | W1° | W2° | W3° | W4° | øB1 H7 | øB2 H7 | M1 | M2 | øTk1 | øTk2 | øS H7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ...010/020... | 200 | 30° | 30° | 90° (4x) | 90° (4x) | 5 ↧10 (1x) | 8 ↧10 (1x) | M8 ↧24 (4x) | M6 ↧14 (4x) | 107 | 56 | 42 ↧10 |
| ...010/020... | 400 | 30° | 30° | 90° (4x) | 90° (4x) | 5 ↧10 (1x) | 8 ↧10 (1x) | M8 ↧24 (4x) | M6 ↧14 (4x) | 107 | 56 | 42 ↧10 |
| ...040... | 200 | 30° | 30° | 60° (6x) | 90° (4x) | 6 ↧10 (1x) | 8 ↧10 (1x) | M10 ↧24 (4x) | M6 ↧14 (6x) | 122 | 66 | 52 ↧10 |
| ...040... | 400 | 30° | 30° | 60° (6x) | 90° (4x) | 6 ↧10 (1x) | 8 ↧10 (1x) | M10 ↧24 (4x) | M6 ↧14 (6x) | 122 | 66 | 52 ↧10 |
| ...040... | 600 | 30° | 30° | 60° (6x) | 90° (4x) | 6 ↧10 (1x) | 8 ↧10 (1x) | M10 ↧24 (4x) | M6 ↧14 (6x) | 122 | 66 | 52 ↧10 |
| ...080... | 400 | 15° | 30° | 60° (6x) | 30° (12x) | 6 ↧10 (1x) | 10 ↧10 (1x) | M16 ↧40 (6x) | M8 ↧16 (12x) | 142 | 87 | 74 ↧10 |
| ...080... | 600 | 15° | 30° | 60° (6x) | 30° (12x) | 6 ↧10 (1x) | 10 ↧10 (1x) | M16 ↧40 (6x) | M8 ↧16 (12x) | 142 | 87 | 74 ↧10 |
| ...080... | 800 | 15° | 30° | 60° (6x) | 30° (12x) | 6 ↧10 (1x) | 10 ↧10 (1x) | M16 ↧40 (6x) | M8 ↧16 (12x) | 142 | 87 | 74 ↧10 |
| ...100... | 400 | 15° | 15° | 30° (8x) | 30° (12x) | 6 ↧10 (1x) | 10 ↧10 (1x) | M16 ↧40 (8x) | M8 ↧16 (12x) | 170 | 102.5 | 90 ↧10 |

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



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## Functional principle with maXYmos NC Type 5847C...

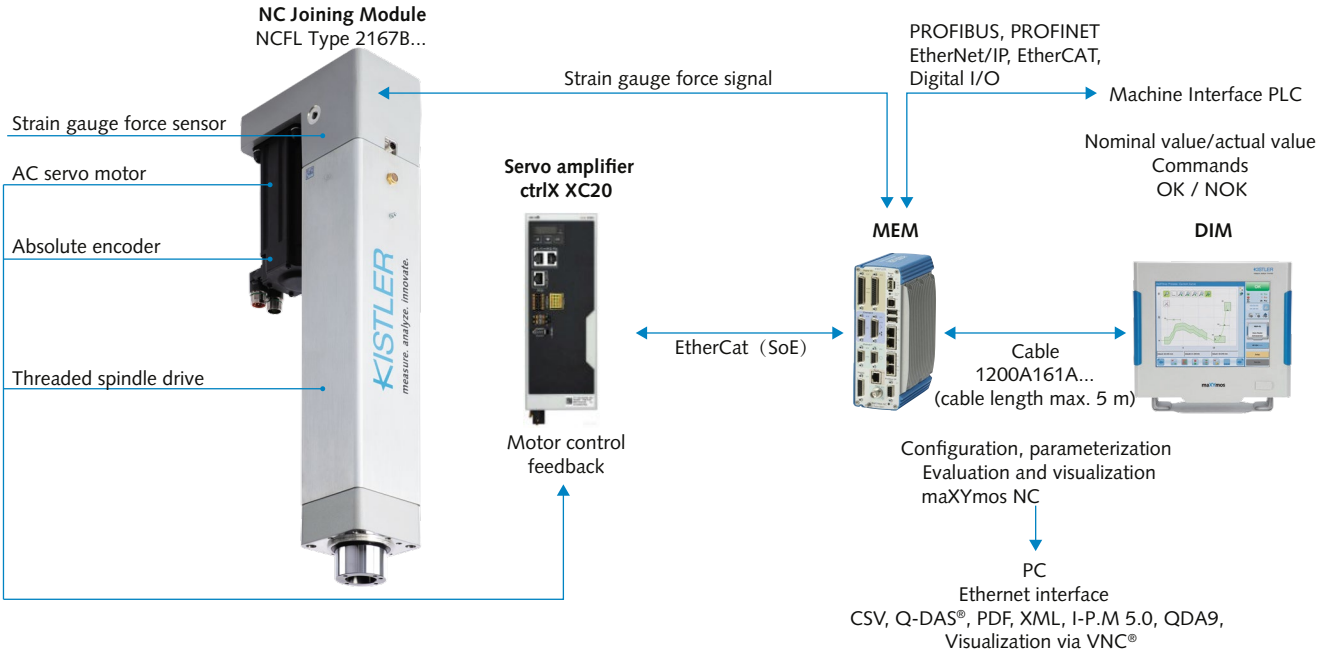



Fig. 2: Functional principle of NC joining system with NC joining module NCFL Type 2167B... and maXYmos NC Type 5847C...

### Included accessories

- None

| Optional accessories | Type/Art. No. |
|---|---|
| • Mounting rail adapter for 35 mm cap rail including 2 fastening screws M3x10 | 5700A31 |
| • Display module (DIM) with pedestal | 5877AZ000 |
| • Connection cable maXYmos MEM on DIM, length 5 m | 1200A161A5 |
| • DIM Cable Extender between maXYmos MEM and Display DIM | 1200A163 |





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## ctrlX XC20 servo amplifier and accessories

The maXYmos NC controls, monitors, evaluates and documents XY progressions for joining and press-fitting processes in combination with NC joining module NCFL and the associated servo amplifier ctrlX XC20.

- Complete ready to use package with all components
- NC joining module specifically parameterized
- EtherCat (SoE) connection to maXYmos NC
- Safe motion on board (STO)
- Applications up to Performance Level e (PL e) possible
- Diagnosis via Ethernet

### Description

A suitable servo amplifier package is available for the NC joining module NCFL. It consists of the following components: a power section, a control unit with the necessary firmware as well as a parameter set, and the required cables. This ensures optimum system performance and at the same time reduces the project planning time required by the application planner for the drive technology to a minimum.

### Application

The motor of the NC joining module NCFL is controlled by the servo amplifier ctrlX XC20. This has a direct influence on the travel distance, travel speed and the maximum force of the NC joining module. The settings of this control are transferred directly via EtherCat (SoE) bus in accordance with the sequence parameterized in the maXYmos NC. This enables flexible implementation of a very wide variety of applications in the range of joining and press-fitting.

### Technical data

**ctrlX XC20 servo amplifier**

| | | |
|---|---|---|
| Interface | | EtherCat (SoE) |
| Control voltage | VDC/W24 | 24 ±5% |
| Power connection | V | AC 380...440 ±10% |
| | Hz | 50 ... 60 ±2% |
| | phases | 3 |
| Weight of power section | | |
| XC20-W0023CRN | kg | 1.54 |
| XC20-W0033CRN | kg | 1.54 |
| XC20-W0050CRN | kg | 2.14 |
| XC20-W0055CRN | kg | 2.14 |
| Protection class | | IP20 |
| Cooling method | | Forced ventilation |




Fig. 3: ctrlX XC20
XC20-W0023/33CRN




Fig. 4: ctrlX XC20
XC20-W0050/55CRN

### Device depths, heights and widths

| Device | NCFL kN | Device width W [mm] | Device depth D [mm] | Device height H [mm] |
|---|---|---|---|---|
| XC20-W0023CRN | 10 | 65 | 246* | 200 |
| XC20-W0033CRN | 20 | 65 | | 200 |
| XC20-W0050CRN | 40 | 80 | | 230 |
| XC20-W0055CRN | 80/100 | 80 | | 230 |

* including base line filter

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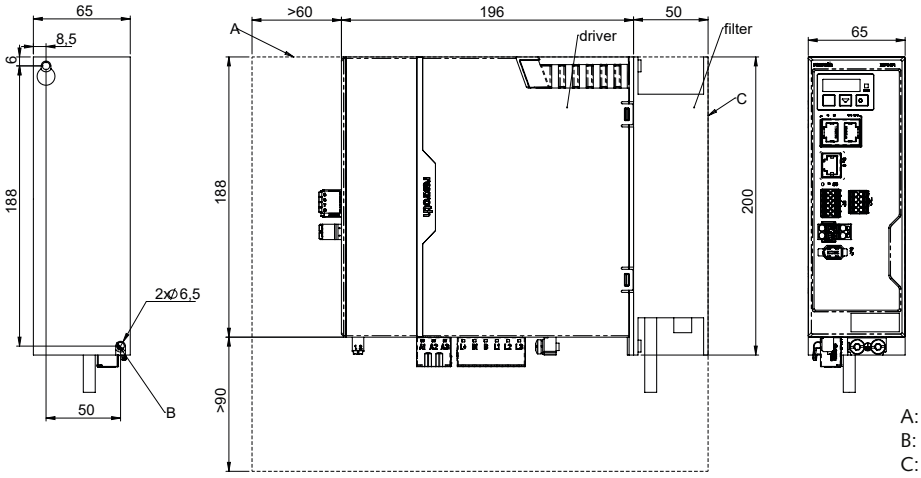


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## Dimensions of Power Section/Converter XC20-W0023/33CRN for NCFL Type 2167B010/020...




A: Minimum assembly space plus space for cables
B: Drilling dimensions
C: Installation surface

XC20-W0023/33CRN standard installation（with line filter）





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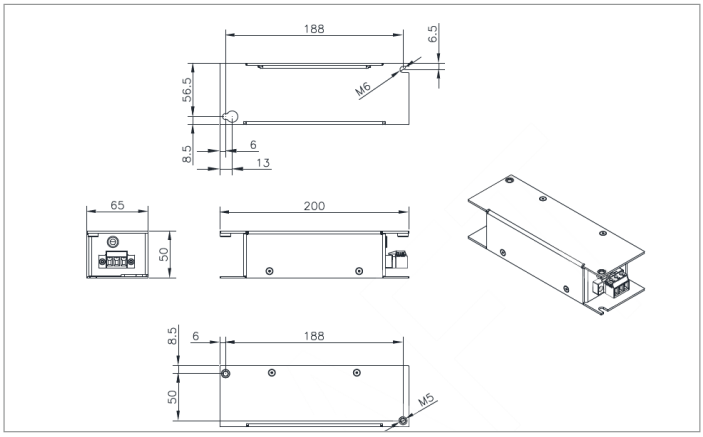
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## Dimensions EMI line filter HFD 141 for NCFL Type 2167B010/020...

| Power section | Line filter |
|---|---|
| XC20-W0023/33CRN | HFD 141 / B 2601075 |

| Dimensions line filter HFD 141 / B 2601075 | | |
|---|---|---|
| H | T | B |
| 200 | 65 | 50 |




Details of the diagram in the assembly drawing are not binding. General tolerances DIN2768-c

## Technical data line filter for NCFL Type 2167B010/020...

| | | |
|---|---|---|
| Phases | | 3 |
| Rated voltage | V | 480 |
| Rated frequency | Hz | 50-60 |
| Rated current | A | 5 |
| Operating current [1] | mA | 40 |
| Operating current [2] | mA | 4 |
| Proof voltage | V– | 2150/2700 |
| Protection class[3] | | IP20 |
| Ambient temperature | °C | 45 |
| Climate range | | 25/85/21 |
| Cooling type | | AN |
| Operating mode | | DB |

[1] Calculated at max. input voltage and loss of 2 phases (type.@50Hz)
[2] Rated on the maximum allowed input voltage swing according to IEC 38 ±10%
[3] Protection class when connected

## Mechanical data line filter for NCFL Type 2167B010/020...

| | | |
|---|---|---|
| Input | mm² | 3x4 |
| | N·m | max. 0.6 |
| Output | AWG | 16 |
| Output cable length L1`/L2`/L3` | mm | 250 ±5 |
| Cables PE | mm | 250 ±5 |
| Fastening bolts | | M6 |
| Weight (net) | kg | ~1.2 |
| Assembly frequency converter | | M5 |

The specified technical data are typical.
According to material and manufacturing deviations can occur.



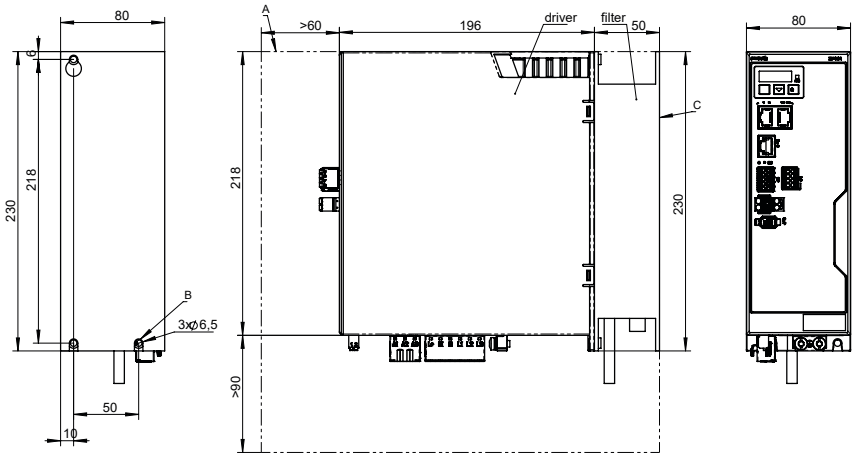


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## Dimensions of Power Section/Converter XC20-W0050/55CRN for NCFL Type 2167B040/080/100...




A: Minimum assembly space plus space for cables
B: Drilling dimensions
C: Installation surface

XC20-W0050/55CRN standard installation (with line filter)





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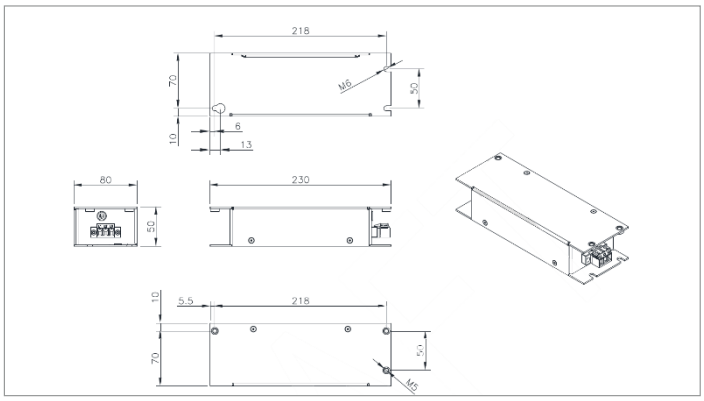
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## Dimensions EMI line filter HFD 141 for NCFL Type 2167B040/080/100...

| Power section | Line filter |
|---|---|
| XC20-W0050/55CRN | HFD 141 / B 2601076 |

| Dimensions line filter HFD 141 / B 2601076 | | |
|---|---|---|
| H | T | B |
| 230 | 80 | 50 |




Details of the diagram in the assembly drawing are not binding. General tolerances DIN2768-c

## Technical data line filter for NCFL Type 2167B040/080/100...

| | | |
|---|---|---|
| Phases | | 3 |
| Rated voltage | V | 480 |
| Rated frequency | Hz | 50-60 |
| Rated current | A | 10 |
| Operating current [1] | mA | 40 |
| Operating current [2] | mA | 4 |
| Proof voltage | V– | 2150/2700 |
| Protection class [3] | | IP20 |
| Ambient temperature | °C | 45 |
| Climate range | | 25/85/21 |
| Cooling type | | AN |
| Operating mode | | DB |

[1] Calculated at max. input voltage and loss of 2 phases (type.@50Hz)
[2] Rated on the maximum allowed input voltage swing according to IEC 38 ±10%
[3] Protection class when connected

The specified technical data are typical.
According to material and manufacturing deviations can occur.

## Mechanical data line filter for NCFL Type 2167B040/080/100...

| | | |
|---|---|---|
| Input | $mm^2$ | 3x4 |
| | N·m | max. 0.6 |
| Output | AWG | 16 |
| Output cable length L1`/L2`/L3` | mm | 250 ±5 |
| Cables PE | mm | 250 ±5 |
| Fastening bolts | | M6 |
| Weight (net) | kg | ~1.5 |
| Assembly frequency converter | | M5 |





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## Ordering example configurator

**2167B □ □ M I L □ □ □ □ □**

| | |
|---|---|
| Type2167B..NCFL10 | 010 |
| Type2167B..NCFL20 | 020 |
| Type2167B..NCFL40 | 040 |
| Type2167B..NCFL80 | 080 |
| Type2167B..NCFL100 | 100 |

| | |
|---|---|
| Stroke length 200 mm (10 ... 40 kN) | 200 |
| Stroke length 400 mm (10 ... 100 kN) | 400 |
| Stroke length 600 mm (40 ... 80 kN) | 600 |
| Stroke length 800 mm (80 kN) | 800 |

| | |
|---|---|
| with maXYmos NC | M |
| with Servo Drive | I |
| with Line filter | L |

**Length Motor cable**

| | |
|---|---|
| 00 | None |
| 05 | 5 m |
| 10 | 10 m |
| 20 | 20 m |
| 30 | 30 m |

| | |
|---|---|
| C | Chinese quick guide |
| E | English quick guide |

**Length EtherCat cable**

| | |
|---|---|
| 00 | None |
| 05 | 5 m |
| 10 | 10 m |
| 20 | 20 m |
| 30 | 30 m |

**Length strain gauge cable**

| | |
|---|---|
| 00 | None |
| 05 | 5 m |
| 10 | 10 m |
| 20 | 20 m |
| 30 | 30 m |

**Length Feedback cable**

| | |
|---|---|
| 00 | None |
| 05 | 5 m |
| 10 | 10 m |
| 20 | 20 m |
| 30 | 30 m |

[1] Motor cable/motor feedback cables must have the same cable length

### Type 2167B 010 400 M I L 10 10 05 00 E

Type 2167B,10kN: 010,

stroke length 400 mm: 400,

with maXYmos NC: M,

with IndraDrive: I,

with line filter: L,

length motor cable 10 m: 10,

length feedback cable 10m: 10,

length stain gauge force cable 5 m: 05,

no EtherCat cable: 00,

English quick guide: E.

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