



**Circuit-breakers 3p 1600 A**

**Part no. NZML4-VE1600**  
**Catalog No. 283217**

**Delivery program**

|                     |  |  |  |
|---------------------|--|--|--|
| Product range       |  |  | Circuit-breaker  |
| Protective function |  |  | Systems, cable, selectivity and generator protection   |
| Standard/Approval   |  |  | IEC  |
| Installation type   |  |  | Fixed  |
| Release system      |  |  | Electronic release   |
| Construction size   |  |  | NZM4   |
| Description         |  |  | R.m.s. value measurement and “thermal memory”<br>Adjustable time delay setting to overcome current peaks $t_r$ at $6 \times I_r$ also infinity (without overload releases)<br>Adjustable delay time $t_{sd}$ |
| Number of poles     |  |  | 3 pole   |
| Standard equipment  |  |  | Screw connection   |





**Switching capacity**

|                 |          |    |     |
|-----------------|----------|----|-----|
| 400/415 V 50 Hz | $I_{cu}$ | kA | 100 |
|-----------------|----------|----|-----|

**Rated current = rated uninterrupted current**

|   |             |   |      |
|---|-------------|---|------|
| Rated current = rated uninterrupted current | $I_n = I_u$ | A | 1600 |
|---|-------------|---|------|

**Setting range**

|   |                             |   |            |
|---|-----------------------------|---|------------|
| Overload trip   |                             |   |            |
|  | $I_r$                       | A | 800 - 1600 |
| Short-circuit releases  |                             |   |            |
|  |                             |   |            |
| Non-delayed   | $I_i = I_n \times \dots$    |   | 2 - 12     |
|  |                             |   |            |
| Delayed   | $I_{sd} = I_r \times \dots$ |   | 2 - 10     |
|  |                             |   |            |

**Technical data**

**General**

|   |  |      |  |
|---|--|------|--|
| Standards   |  |      | IEC/EN 60947   |
| Protection against direct contact   |  |      | Finger and back of hand proof to VDE 0106 Part 100                             |
| Climatic proofing   |  |      | Damp heat, constant, to IEC 60068-2-78<br>Damp heat, cyclic, to IEC 60068-2-30 |
| Ambient temperature   |  |      |  |
| Ambient temperature, storage  |  | °C   | - 40 - + 70  |
| Operation   |  | °C   | -25 - +70  |
| Mechanical shock resistance (10 ms half-sinusoidal shock) according to IEC 60068-2-27 |  | g    | 15 (half-sinusoidal shock 11 ms)   |
| Safe isolation to EN 61140  |  |      |  |
| Between auxiliary contacts and main contacts  |  | V AC | 500  |
| between the auxiliary contacts  |  | V AC | 300  |
| Weight  |  | kg   | 21   |
| Mounting position   |  |      | Vertical and 90° in all directions   |



With XFI earth-fault release:  
 - NZM1, N1, NZM2, N2: vertical and 90° in all directions  
 with plug-in unit  
 - NZM1, N1, NZM2, N2: vertical, 90° right/left  
 with withdrawable unit:  
 - NZM3, N3: vertical, 90° right/left  
 - NZM4, N4: vertical  
 with remote operator:  
 - NZM2, N(S)2, NZM3, N(S)3, NZM4, N(S)4: vertical and 90° in all directions

|  |  |  |
|--|--|--|
| Direction of incoming supply           |  | as required  |
| Degree of protection                   |  |  |
| Device                                 |  | In the operating controls area: IP20 (basic degree of protection)        |
| Enclosures                             |  | With insulating surround: IP40<br>With door coupling rotary handle: IP66 |
| Terminations                           |  | Tunnel terminal: IP10<br>Phase isolator and strip terminal: IP00         |
| Other technical data (sheet catalogue) |  | Temperature dependency, Derating   |

### Circuit-breakers

|   |             |      |       |
|---|-------------|------|-------|
| Rated current = rated uninterrupted current | $I_n = I_u$ | A    | 1600  |
| Rated surge voltage invariability           | $U_{imp}$   |      |       |
| Main contacts                               |             | V    | 8000  |
| Auxiliary contacts                          |             | V    | 6000  |
| Rated operational voltage                   | $U_e$       | V AC | 690   |
| Overvoltage category/pollution degree       |             |      | III/3 |
| Rated insulation voltage                    | $U_i$       | V    | 1000  |
| Use in unearthed supply systems             |             | V    | ≤ 525 |

### Switching capacity

|  |            |    |   |
|--|------------|----|---|
| Rated short-circuit making capacity  | $I_{cm}$   |    |   |
| 240 V  | $I_{cm}$   | kA | 275   |
| 400/415 V  | $I_{cm}$   | kA | 220   |
| 440 V 50/60 Hz   | $I_{cm}$   | kA | 187   |
| 525 V 50/60 Hz   | $I_{cm}$   | kA | 143   |
| 690 V 50/60 Hz   | $I_c$      | kA | 105   |
| Rated short-circuit breaking capacity $I_{cn}$                               | $I_{cn}$   |    |   |
| $I_{cu}$ to IEC/EN 60947 test cycle O-t-CO                                   | $I_{cu}$   | kA |   |
| 240 V 50/60 Hz   | $I_{cu}$   | kA | 125   |
| 400/415 V 50/60 Hz   | $I_{cu}$   | kA | 100   |
| 440 V 50/60 Hz   | $I_{cu}$   | kA | 85  |
| 525 V 50/60 Hz   | $I_{cu}$   | kA | 65  |
| 690 V 50/60 Hz   | $I_{cu}$   | kA | 50  |
| $I_{cs}$ to IEC/EN 60947 test cycle O-t-CO-t-CO                              | $I_{cs}$   | kA |   |
| 240 V 50/60 Hz   | $I_{cs}$   | kA | 63  |
| 400/415 V 50/60 Hz   | $I_{cs}$   | kA | 50  |
| 440 V 50/60 Hz   | $I_{cs}$   | kA | 43  |
| 525 V 50/60 Hz   | $I_{cs}$   | kA | 49  |
| 690 V 50/60 Hz   | $I_{cs}$   | kA | 37  |
| Rated short-time withstand current   |            |    | Maximum back-up fuse, if the expected short-circuit currents at the installation location exceed the switching capacity of the circuit-breaker. |
| $t = 0.3$ s  | $I_{cw}$   | kA | 19.2  |
| $t = 1$ s  | $I_{cw}$   | kA | 19.2  |
| Utilization category to IEC/EN 60947-2                                       |            |    | B   |
| Lifespan, mechanical (of which max. 50 % trip by shunt/undervoltage release) | Operations |    | 10000   |
| Lifespan, electrical   |            |    |   |
| AC-1   |            |    |   |
| 400 V 50/60 Hz   | Operations |    | 3000  |

|                                   |            |                            |
|-----------------------------------|------------|----------------------------|
| 415 V 50/60 Hz                    | Operations | 3000                       |
| 690 V 50/60 Hz                    | Operations | 2000                       |
| AC--3                             |            |                            |
| 400 V 50/60 Hz                    | Operations | 2000                       |
| 415 V 50/60 Hz                    | Operations | 2000                       |
| 690 V 50/60 Hz                    | Operations | 1000                       |
| Max. operating frequency          | Ops/h      | 60                         |
| Total break time at short-circuit | ms         | < 25 ≤ 415 V; < 35 > 415 V |

### Terminal capacity

|   |      |                 |   |
|---|------|-----------------|---|
| Standard equipment  |      |                 | Screw connection  |
| Optional accessories                                      |      |                 | Tunnel terminal<br>connection on rear<br>Strip terminal |
| Round copper conductor                                    |      |                 |   |
| Tunnel terminal   |      |                 |   |
| Stranded  |      |                 |   |
| 4-hole  |      | mm <sup>2</sup> | 4 x (50 - 240)  |
| Bolt terminal and rear-side connection                    |      |                 |   |
| Direct on the switch                                      |      |                 |   |
| Stranded  |      | mm <sup>2</sup> | 1 x (120 - 185)<br>4 x (50 - 185)                       |
| Module plate  |      |                 |   |
| Single hole   | min. | mm <sup>2</sup> | 1 x (120 - 300)   |
| Single hole   | max. | mm <sup>2</sup> | 2 x (95 - 300)  |
| Module plate  |      |                 |   |
| Double hole   | min. | mm <sup>2</sup> | 2 x (95 - 185)  |
| Double hole   | max. | mm <sup>2</sup> | 4 x (35 - 185)  |
| Connection width extension                                |      | mm <sup>2</sup> |   |
| Connection width extension                                |      | mm <sup>2</sup> | 4 x 300<br>6 x (95 - 240)                               |
| Al circular conductor                                     |      |                 |   |
| Tunnel terminal   |      |                 |   |
| Stranded  |      |                 |   |
| 4-hole  |      | mm <sup>2</sup> | 4 x (50 - 240)  |
| Cu strip (number of segments x width x segment thickness) |      |                 |   |
| Flat conductor terminal                                   |      |                 |   |
|   | min. | mm              | 6 x 16 x 0.8  |
|   | max. | mm              | (2 x) 10 x 32 x 1.0                                     |
| Module plate  |      |                 |   |
| Single hole   |      | mm              | (2 x) 10 x 50 x 1.0                                     |
| Bolt terminal and rear-side connection                    |      |                 |   |
| Flat copper strip, with holes                             | min. | mm              | 5 x 25 x 1.0  |
| Flat copper strip, with holes                             | max. | mm              | (2 x) 10 x 50 x 1.0                                     |
| Connection width extension                                |      | mm              | (2 x) 10 x 80 x 1.0                                     |
| Copper busbar (width x thickness)                         | mm   |                 |   |
| Bolt terminal and rear-side connection                    |      |                 |   |
| Screw connection  |      |                 | M10   |
| Direct on the switch                                      |      |                 |   |
|   | min. | mm              | 25 x 5  |
|   | max. | mm              | 2 x (50 x 10)   |
| Module plate  |      |                 |   |
| Single hole   | min. | mm              | 25 x 5  |
| Single hole   | max. | mm              | 2 x (50 x 10)   |
| Module plate  |      |                 |   |
| Double hole   |      | mm              | 2 x (50 x 10)   |
| Connection width extension                                |      | mm              |   |

|                            |      |                 |                                      |
|----------------------------|------|-----------------|--------------------------------------|
| Connection width extension | min. | mm              | 60 x 10                              |
| Connection width extension | max. | mm              | 2 x (80 x 10)                        |
| Control cables             |      |                 |                                      |
|                            |      | mm <sup>2</sup> | 1 x (0.75 - 2.5)<br>2 x (0.75 - 1.5) |

## Design verification as per IEC/EN 61439

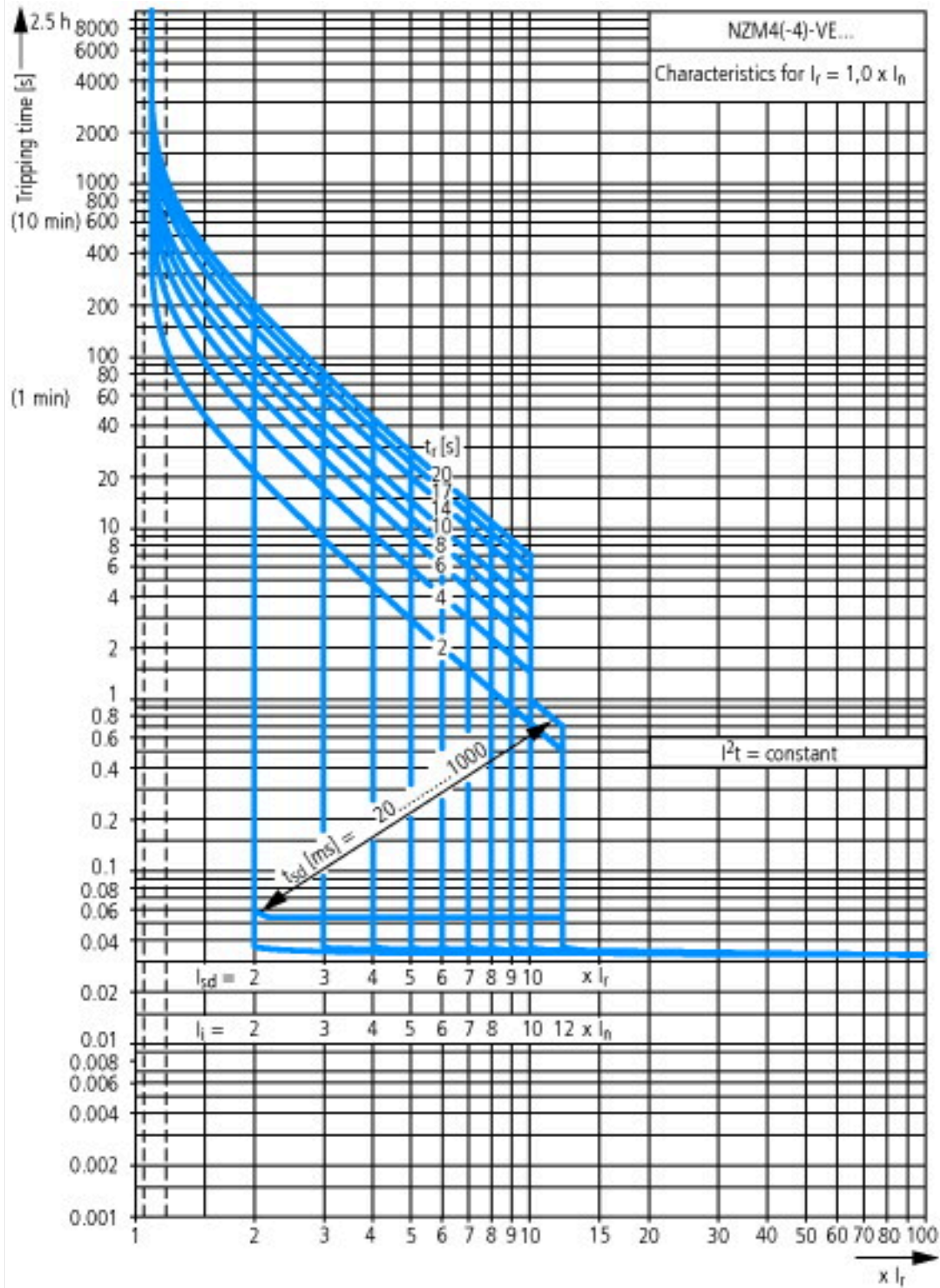
| Technical data for design verification   |                  |    |  |
|--|------------------|----|--|
| Rated operational current for specified heat dissipation   | I <sub>n</sub>   | A  | 1600   |
| Equipment heat dissipation, current-dependent  | P <sub>vid</sub> | W  | 284  |
| Operating ambient temperature min.   |                  | °C | -25  |
| Operating ambient temperature max.   |                  | °C | 70   |
| IEC/EN 61439 design verification   |                  |    |  |
| 10.2 Strength of materials and parts   |                  |    |  |
| 10.2.2 Corrosion resistance  |                  |    | Meets the product standard's requirements.   |
| 10.2.3.1 Verification of thermal stability of enclosures   |                  |    | Meets the product standard's requirements.   |
| 10.2.3.2 Verification of resistance of insulating materials to normal heat   |                  |    | Meets the product standard's requirements.   |
| 10.2.3.3 Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects |                  |    | Meets the product standard's requirements.   |
| 10.2.4 Resistance to ultra-violet (UV) radiation   |                  |    | Meets the product standard's requirements.   |
| 10.2.5 Lifting   |                  |    | Does not apply, since the entire switchgear needs to be evaluated.   |
| 10.2.6 Mechanical impact   |                  |    | Does not apply, since the entire switchgear needs to be evaluated.   |
| 10.2.7 Inscriptions  |                  |    | Meets the product standard's requirements.   |
| 10.3 Degree of protection of ASSEMBLIES  |                  |    | Does not apply, since the entire switchgear needs to be evaluated.   |
| 10.4 Clearances and creepage distances   |                  |    | Meets the product standard's requirements.   |
| 10.5 Protection against electric shock   |                  |    | Does not apply, since the entire switchgear needs to be evaluated.   |
| 10.6 Incorporation of switching devices and components   |                  |    | Does not apply, since the entire switchgear needs to be evaluated.   |
| 10.7 Internal electrical circuits and connections  |                  |    | Is the panel builder's responsibility.   |
| 10.8 Connections for external conductors   |                  |    | Is the panel builder's responsibility.   |
| 10.9 Insulation properties   |                  |    |  |
| 10.9.2 Power-frequency electric strength   |                  |    | Is the panel builder's responsibility.   |
| 10.9.3 Impulse withstand voltage   |                  |    | Is the panel builder's responsibility.   |
| 10.9.4 Testing of enclosures made of insulating material   |                  |    | Is the panel builder's responsibility.   |
| 10.10 Temperature rise   |                  |    | The panel builder is responsible for the temperature rise calculation. Eaton will provide heat dissipation data for the devices. |
| 10.11 Short-circuit rating   |                  |    | Is the panel builder's responsibility. The specifications for the switchgear must be observed.                                   |
| 10.12 Electromagnetic compatibility  |                  |    | Is the panel builder's responsibility. The specifications for the switchgear must be observed.                                   |
| 10.13 Mechanical function  |                  |    | The device meets the requirements, provided the information in the instruction leaflet (IL) is observed.                         |

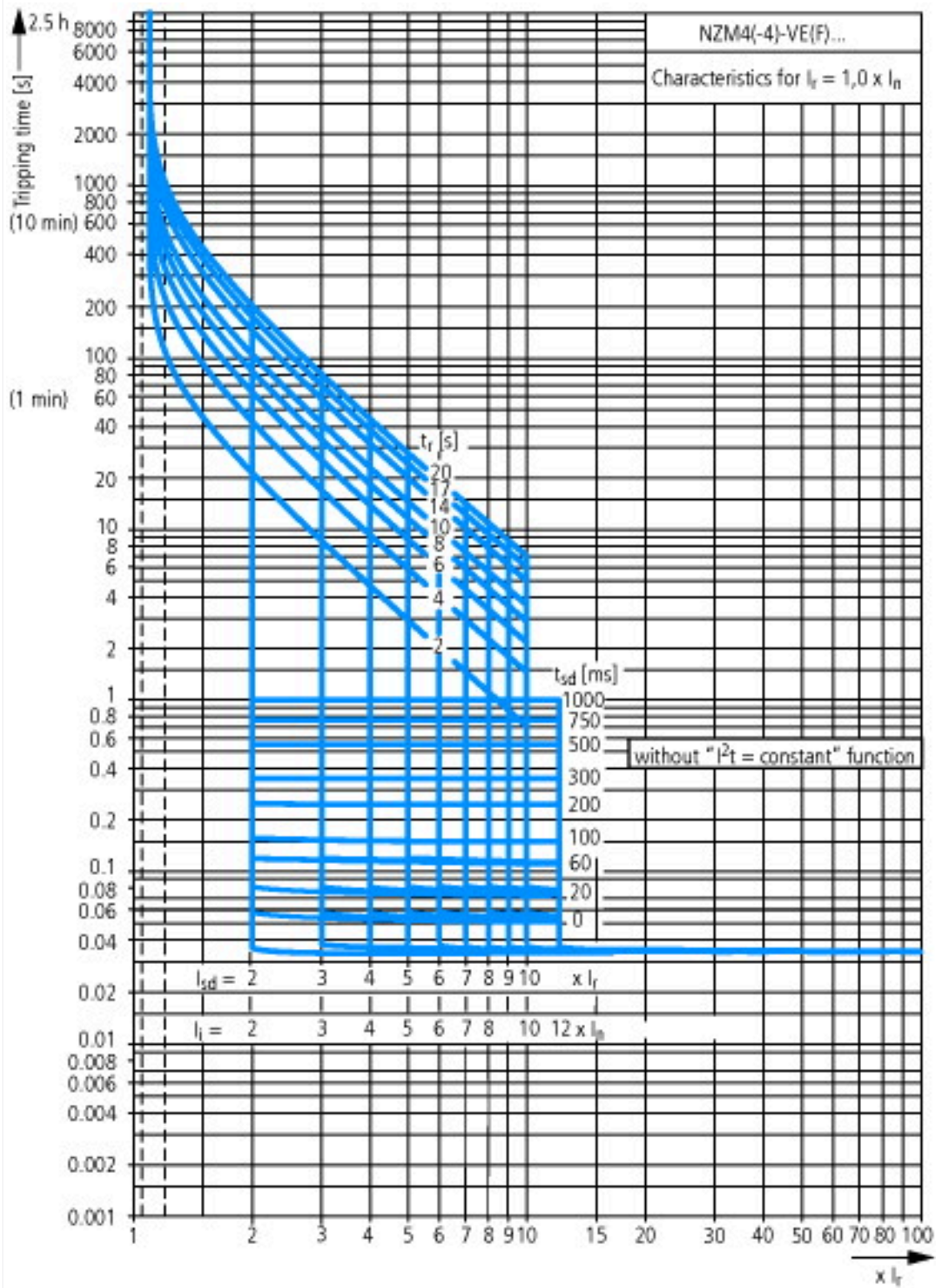
## Technical data ETIM 7.0

| Low-voltage industrial components (EG000017) / Power circuit-breaker for trafo/generator/installation protection (EC000228)   |  |    |  |
|---|--|----|--|
| Electric engineering, automation, process control engineering / Low-voltage switch technology / Circuit breaker (LV < 1 kV) / Circuit breaker for power transformer, generator and system protection (ecl@ss10.0.1-27-37-04-09 [AJZ716013]) |  |    |  |
| Rated permanent current I <sub>u</sub>  |  | A  | 1600                                     |
| Rated voltage   |  | V  | 690 - 690                                |
| Rated short-circuit breaking capacity I <sub>cu</sub> at 400 V, 50 Hz   |  | kA | 100                                      |
| Overload release current setting  |  | A  | 800 - 1600                               |
| Adjustment range short-term delayed short-circuit release   |  | A  | 1600 - 16000                             |
| Adjustment range undelayed short-circuit release  |  | A  | 3200 - 19200                             |
| Integrated earth fault protection   |  |    | No                                       |
| Type of electrical connection of main circuit   |  |    | Screw connection                         |
| Device construction   |  |    | Built-in device fixed built-in technique |
| Suitable for DIN rail (top hat rail) mounting   |  |    | No                                       |
| DIN rail (top hat rail) mounting optional   |  |    | No                                       |
| Number of auxiliary contacts as normally closed contact   |  |    | 0  |

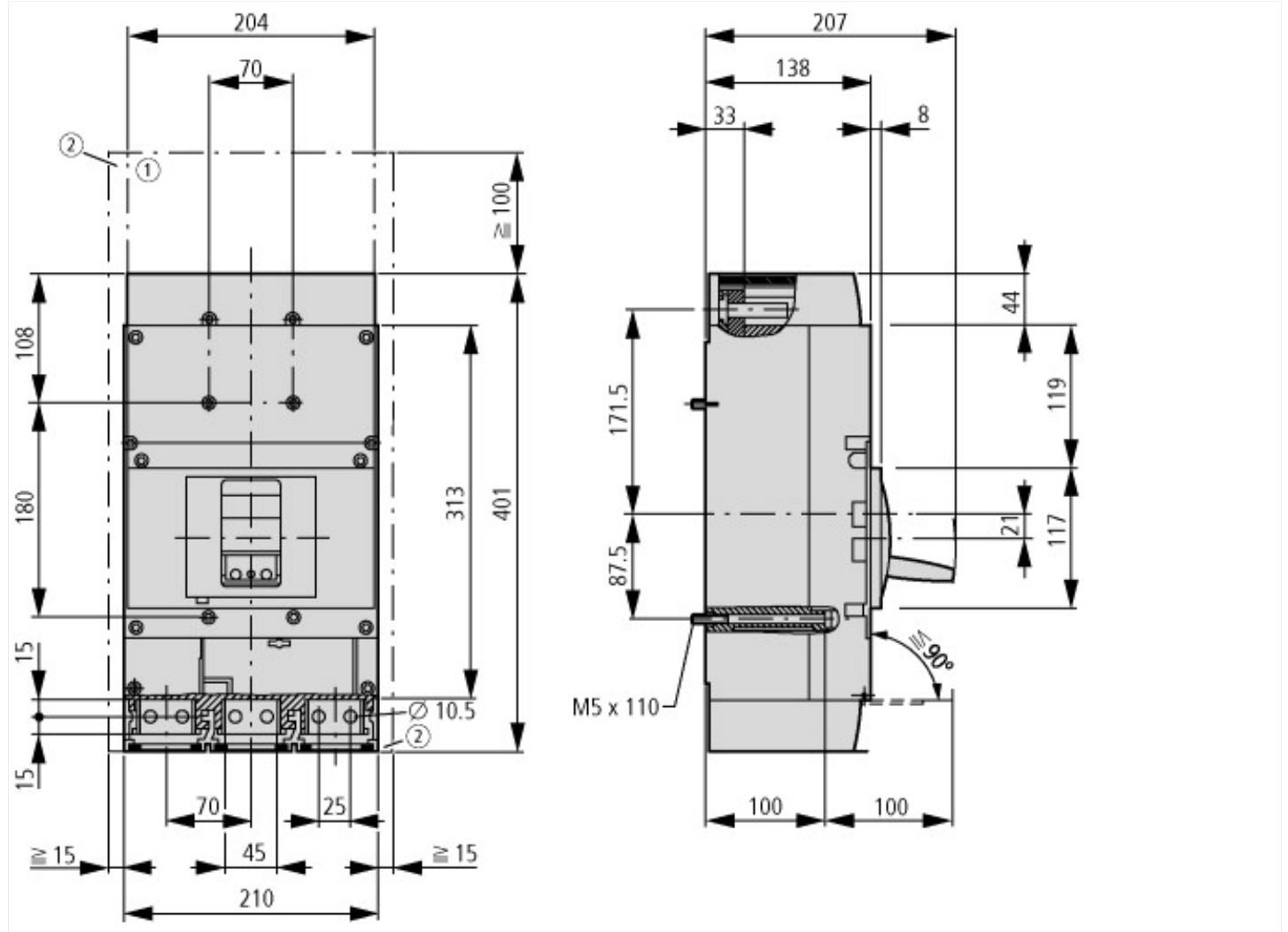
|   |  |              |
|---|--|--------------|
| Number of auxiliary contacts as normally open contact |  | 0            |
| Number of auxiliary contacts as change-over contact   |  | 0            |
| With switched-off indicator                           |  | No           |
| With under voltage release                            |  | No           |
| Number of poles                                       |  | 3            |
| Position of connection for main current circuit       |  | Front side   |
| Type of control element                               |  | Rocker lever |
| Complete device with protection unit                  |  | Yes          |
| Motor drive integrated                                |  | No           |
| Motor drive optional                                  |  | Yes          |
| Degree of protection (IP)                             |  | IP20         |

## Characteristics





## Dimensions



① Blow out area, minimum clearance to adjacent parts

U<sub>i</sub> ≤ 690 V: 100 mm

U<sub>i</sub> ≤ 1500 V: 200 mm

② Minimum clearance to adjacent parts

U<sub>i</sub> ≤ 1000 V: 15 mm

U<sub>i</sub> ≤ 1500 V: 70 mm

## Additional product information (links)

|   |   |
|---|---|
| Temperature dependency, Derating                      | <a href="http://ecat.moeller.net/flip-cat/?edition=HPLEN&amp;startpage=17.172">http://ecat.moeller.net/flip-cat/?edition=HPLEN&amp;startpage=17.172</a>   |
| CurveSelect characteristics program                   | <a href="http://www.eaton.eu/DE/Europe/Electrical/CustomersSupport/ConfigurationTools/CharacteristicsProgram/index.htm">http://www.eaton.eu/DE/Europe/Electrical/CustomersSupport/ConfigurationTools/CharacteristicsProgram/index.htm</a>         |
| Eaton configurator                                    | <a href="http://www.eaton.eu/DE/Europe/Electrical/CustomersSupport/ConfigurationTools/ConfiguratorCircuitBreaker/index.htm">http://www.eaton.eu/DE/Europe/Electrical/CustomersSupport/ConfigurationTools/ConfiguratorCircuitBreaker/index.htm</a> |
| additional technical information for NZM power switch | <a href="https://es-assets.eaton.com/DOCUMENTATION/PDF/nzm_technic_de_en.pdf">https://es-assets.eaton.com/DOCUMENTATION/PDF/nzm_technic_de_en.pdf</a>   |