

**Technical data of compact MCB's - Unibis™**

| Series                                                      |                                 |                    | EC 91E NR            | EC 91 NR             |
|-------------------------------------------------------------|---------------------------------|--------------------|----------------------|----------------------|
| Standards                                                   |                                 |                    | EN/IEC 60898-1       | EN/IEC 60898-1       |
| Tripping characteristics                                    |                                 |                    | B,C                  | B,C                  |
| Nominal current (In)                                        |                                 |                    | 2-40                 | 2-40                 |
| Calibration temperature (°C)                                |                                 |                    | 30                   | 30                   |
| Number of poles (# mod)                                     |                                 |                    | 1+N (1 mod)          | 1+N (1 mod)          |
| Neutral pole protected                                      |                                 |                    | -                    | -                    |
| Nominal voltage Un AC                                       |                                 |                    | 230                  | 230                  |
|                                                             | 1P+N                            | (V)                |                      |                      |
|                                                             | 1P+1P                           | (V)                | -                    | -                    |
|                                                             | 2P                              | (V)                | -                    | -                    |
|                                                             | 3P                              | (V)                | -                    | -                    |
|                                                             | 4P                              | (V)                | -                    | -                    |
| Nominal voltage Un DC                                       |                                 |                    | -                    | -                    |
|                                                             | 2P                              | (V=)               |                      |                      |
| Frequency                                                   |                                 |                    | 50/60                | 50/60                |
|                                                             |                                 | (Hz)               |                      |                      |
|                                                             |                                 | in DC              | Thresh. magn. + 40%  | Thresh. magn. + 40%  |
|                                                             |                                 | for 400 Hz         | Thresh. magn. + 50%  | Thresh. magn. + 50%  |
| Maximum service voltage Ub max (V)                          |                                 |                    | 250                  | 250                  |
| Minimum service voltage Ub min (V)                          |                                 |                    | 12                   | 12                   |
| Selectivity class (EN 60898-1)                              |                                 |                    | 3                    | 3                    |
| Rated insulation voltage                                    |                                 |                    | 500                  | 500                  |
|                                                             | Pollution degree 2              | (V)                |                      |                      |
|                                                             | Pollution degree 3              | (V)                | 400                  | 400                  |
| Impulse withstand test voltage (kV)                         |                                 |                    | 6                    | 6                    |
| Insulation resistance (MΩ)                                  |                                 |                    | 1000                 | 1000                 |
| Dielectric rigidity (kV)                                    |                                 |                    | 2.5                  | 2.5                  |
| Vibration resistance (in x,y,z direction) (IEC 77/16.3) (g) |                                 |                    | 3                    | 3                    |
| Endurance                                                   |                                 |                    | 10000 <sup>(1)</sup> | 10000 <sup>(1)</sup> |
|                                                             | Electrical at Un,In             | # op.              |                      |                      |
|                                                             | Mechanical                      | # op.              | 20000                | 20000                |
| Utilisation category (EN 60947-2)                           |                                 |                    | A                    | A                    |
| Mounting position: vertical/horizontal                      |                                 |                    | any                  | any                  |
| Incoming top or bottom                                      |                                 |                    | yes                  | yes                  |
| Protection degree (outside/inside enclosure with door)      |                                 |                    | IP20/IP40            | IP20/IP40            |
| Selfextinguish degree (acc. UL 94)                          |                                 |                    | V2                   | V2                   |
| Tropicalisation (acc. EN 60068-2/DIN 40046)                 |                                 |                    | +55°C/95%RH          | +55°C/95%RH          |
| Operating temperature (°C)                                  |                                 |                    | -25/+55              | -25/+55              |
| Storage temperature (°C)                                    |                                 |                    | -55/+55              | -55/+55              |
| Terminal capacity                                           |                                 |                    | 1/16 <sup>(2)</sup>  | 1/16 <sup>(2)</sup>  |
|                                                             | Rigid cable min/max (top)       | (mm <sup>2</sup> ) |                      |                      |
|                                                             | Flexible cable min/max (top)    | (mm <sup>2</sup> ) | 1/10 <sup>(2)</sup>  | 1/10 <sup>(2)</sup>  |
|                                                             | Rigid cable min/max (bottom)    | (mm <sup>2</sup> ) | 1/16 <sup>(2)</sup>  | 1/16 <sup>(2)</sup>  |
|                                                             | Flexible cable min/max (bottom) | (mm <sup>2</sup> ) | 1/10 <sup>(2)</sup>  | 1/10 <sup>(2)</sup>  |
| Torque (Nm)                                                 |                                 |                    | 3                    | 3                    |
| Add-on devices                                              |                                 |                    | yes                  | yes                  |
|                                                             | Auxiliary contacts              |                    | yes <sup>(3)</sup>   | yes <sup>(3)</sup>   |
|                                                             | Under voltage trip NUVR         |                    | yes <sup>(3)</sup>   | yes <sup>(3)</sup>   |
|                                                             | Remote release NF               |                    | yes <sup>(3)</sup>   | yes <sup>(3)</sup>   |
|                                                             | Remote drive NFA                |                    | yes <sup>(3)</sup>   | yes <sup>(3)</sup>   |
|                                                             | Panelboard switch NLVS          |                    | yes <sup>(3)</sup>   | yes <sup>(3)</sup>   |
| Busbar systems                                              |                                 |                    | yes/yes              | yes/yes              |
|                                                             | Pin (top/bottom)                |                    | no/no                | no/no                |
|                                                             | Fork (top/bottom)               |                    | yes                  | yes                  |
| Accessories                                                 |                                 |                    | yes                  | yes                  |
| Width per mod. (mm)                                         |                                 |                    | 18                   | 18                   |
| Weight per mod. (gr)                                        |                                 |                    | 125                  | 125                  |
| Package # mod.                                              |                                 |                    | 12                   | 12                   |
| Approvals                                                   |                                 |                    | KEMA, IMQ            | VDE, KEMA, IMQ       |
| CE-marking                                                  |                                 |                    | yes                  | yes                  |
| Page                                                        |                                 |                    | A.36                 | A.37                 |

**Short-circuit capacity of compact MCB's**

| Series                           |       |       | EC 91E NR | EC 91 NR |
|----------------------------------|-------|-------|-----------|----------|
| <b>Short-circuit capacity AC</b> |       |       | (kA)      | (kA)     |
| EN/IEC 60898-1                   |       |       | 4.5       | 6        |
|                                  | 1P+N  | 230 V | -         | -        |
|                                  | 1P+1P | 230 V | -         | -        |
|                                  | 2P    | 400 V | -         | -        |
|                                  | 3P    | 400 V | -         | -        |
|                                  | 4P    | 400 V | -         | -        |
| EN 60947-2 <b>Ics</b> (service)  |       |       | 6         | 7.5      |
|                                  | 1P+N  | 230 V | -         | -        |
|                                  | 1P+1P | 230 V | -         | -        |
|                                  | 2P    | 415 V | -         | -        |
|                                  | 3P    | 415 V | -         | -        |
|                                  | 4P    | 415 V | -         | -        |
| <b>Short-circuit capacity DC</b> |       |       |           |          |
| EN 60947-2 <b>Icu</b>            |       |       |           |          |
|                                  | 2P    | 96 V= |           |          |

(1) 8000 for 32 and 40 A

(2) Also accepting (2x4mm<sup>2</sup>) or (1x4mm<sup>2</sup>)+(1x6mm<sup>2</sup>)

(3) Requires CA auxiliary contact as interface

(4) Icn1 = 6kA

| EC 91S NR            | EC 911               | EC 90E                 | EC 90                  | DA 41N               |
|----------------------|----------------------|------------------------|------------------------|----------------------|
| EN/IEC 60898-1       | EN/IEC 60898-1       | EN/IEC 60898-1         | EN/IEC 60898-1         | EN/IEC 60898-1       |
| B,C                  | B,C                  | B,C                    | B,C                    | C                    |
| 2-40                 | 2-40                 | 2-40                   | 2-40                   | 2-40                 |
| 30                   | 30                   | 30                     | 30                     | 30                   |
| 1+N (1 mod)          | 1P+1P (1 mod)        | 2 (1 mod), 3&4 (2 mod) | 2 (1 mod), 3&4 (2 mod) | 1+N (1 mod)          |
| -                    | -                    | -                      | -                      | -                    |
| 230                  | -                    | -                      | -                      | 230                  |
| -                    | 230                  | -                      | -                      | -                    |
| -                    | -                    | 400                    | 400                    | -                    |
| -                    | -                    | 400                    | 400                    | -                    |
| -                    | -                    | 400                    | 400                    | -                    |
| -                    | -                    | 96                     | 96                     | -                    |
| 50/60                | 50/60                | 50/60                  | 50/60                  | 50/60                |
| Thresh. magn. + 40%  | Thresh. magn. + 40%  | Thresh. magn. + 40%    | Thresh. magn. + 40%    | Thresh. magn. + 40%  |
| Thresh. magn. + 50%  | Thresh. magn. + 50%  | Thresh. magn. + 50%    | Thresh. magn. + 50%    | Thresh. magn. + 50%  |
| 250                  | 250/440              | 250/440                | 250/440                | 250                  |
| 12                   | 12                   | 12                     | 12                     | 12                   |
| 3                    | 3                    | 3                      | 3                      | 3                    |
| 500                  | 500                  | 500                    | 500                    | 500                  |
| 400                  | 400                  | 400                    | 400                    | 400                  |
| 6                    | 6                    | 6                      | 6                      | 6                    |
| 1000(1)              | 1000                 | 10000                  | 10000                  | 1000                 |
| 2.5                  | 2.5                  | 2.5                    | 2.5                    | 2.5                  |
| 3                    | 3                    | 3                      | 3                      | 3                    |
| 10000 <sup>(1)</sup> | 10000 <sup>(1)</sup> | 10000 <sup>(1)</sup>   | 10000 <sup>(1)</sup>   | 10000 <sup>(1)</sup> |
| 20000                | 20000                | 20000                  | 20000                  | 20000                |
| A                    | A                    | A                      | A                      | A                    |
| any                  | any                  | any                    | any                    | any                  |
| yes                  | yes                  | yes                    | yes                    | yes                  |
| IP20/IP40            | IP20/IP40            | IP20/IP40              | IP20/IP40              | IP20/IP40            |
| V2                   | V2                   | V2                     | V2                     | V2                   |
| +55°C/95%RH          | +55°C/95%RH          | +55°C/95%RH            | +55°C/95%RH            | +55°C/95%RH          |
| -25/+55              | -25/+55              | -25/+55                | -25/+55                | -25/+55              |
| -55/+55              | -55/+55              | -55/+55                | -55/+55                | -55/+55              |
| 1/16 <sup>(2)</sup>  | 1/16 <sup>(2)</sup>  | 1/16 <sup>(2)</sup>    | 1/16 <sup>(2)</sup>    | 1/16 <sup>(2)</sup>  |
| 1/10 <sup>(2)</sup>  | 1/10 <sup>(2)</sup>  | 1/10 <sup>(2)</sup>    | 1/10 <sup>(2)</sup>    | 1/10 <sup>(2)</sup>  |
| 1/16 <sup>(2)</sup>  | 1/16 <sup>(2)</sup>  | 1/16 <sup>(2)</sup>    | 1/16 <sup>(2)</sup>    | 1/16 <sup>(2)</sup>  |
| 1/10 <sup>(2)</sup>  | 1/10 <sup>(2)</sup>  | 1/10 <sup>(2)</sup>    | 1/10 <sup>(2)</sup>    | 1/10 <sup>(2)</sup>  |
| 3                    | 3                    | 3                      | 3                      | 3                    |
| yes                  | yes                  | yes                    | yes                    | no                   |
| yes <sup>(3)</sup>   | yes <sup>(3)</sup>   | yes <sup>(3)</sup>     | yes <sup>(3)</sup>     | no                   |
| yes <sup>(3)</sup>   | yes <sup>(3)</sup>   | yes <sup>(3)</sup>     | yes <sup>(3)</sup>     | no                   |
| yes <sup>(3)</sup>   | yes <sup>(3)</sup>   | yes <sup>(3)</sup>     | yes <sup>(3)</sup>     | no                   |
| yes <sup>(3)</sup>   | yes <sup>(3)</sup>   | yes <sup>(3)</sup>     | yes <sup>(3)</sup>     | no                   |
| yes/yes              | yes/yes              | yes/yes                | yes/yes                | yes/yes              |
| no/no                | no/no                | no/no                  | no/no                  | no/no                |
| yes                  | yes                  | yes                    | yes                    | yes                  |
| 18                   | 18                   | 18/36                  | 18/36                  | 18                   |
| 125                  | 160                  | 160/320                | 160/320                | 125                  |
| 12                   | 12/6                 | 12/6                   | 12/6                   | 12                   |
| KEMA                 | VDE, IMQ             | IMQ, NF                | VDE, IMQ, NF, CEBEC    | IMQ, KEMA            |
| yes                  | yes                  | yes                    | yes                    | yes                  |
| A.38                 | A.39                 | A.40                   | A.42                   | A.44                 |

| EC 91S NR         | EC 911 | EC 90E | EC 90 | DA 41N |
|-------------------|--------|--------|-------|--------|
| (kA)              | (kA)   | (kA)   | (kA)  | (kA)   |
| 10 <sup>(4)</sup> | -      | -      | -     | 4.5    |
| -                 | 6      | -      | -     | -      |
| -                 | -      | 4.5    | 6     | -      |
| -                 | -      | 4.5    | 6     | -      |
| -                 | -      | 4.5    | 6     | -      |
| 10                | -      | -      | -     | -      |
| -                 | 6      | -      | -     | -      |
| -                 | -      | 6      | 7.5   | -      |
| -                 | -      | 6      | 7.5   | -      |
| -                 | -      | 6      | 7.5   | -      |
| -                 | -      | 4.5    | 6     | -      |

(1) 8000 for 32 and 40 A

(2) Also accepting (2x4mm<sup>2</sup>) or (1x4mm<sup>2</sup>)+(1x6mm<sup>2</sup>)

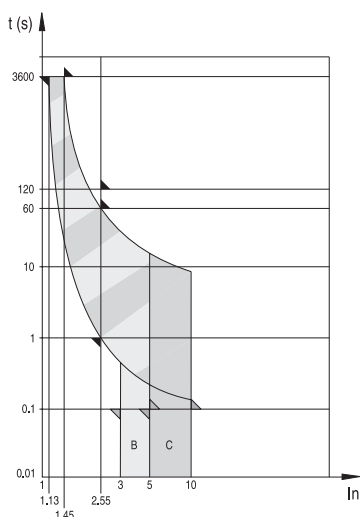
(3) Requires CA auxiliary contact as interface

(4) Icn1= 6kA

## Characteristics according to IEC/EN 60898-1

Miniature Circuit Breakers (MCB) are intended for the protection of wiring installations against both overloads and short-circuits in domestic or commercial wiring installations where operation is possible by untrained people.

Tripping characteristic curves (EN/IEC 60898-1)



## Magnetic release

An electromagnet with plunger ensures instantaneous tripping in the event of short-circuit. The standard distinguishes two different types, following the current for instantaneous release: type B and C.

| ICn (A) | Test current | Tripping time                                        | Applications                                                                            |
|---------|--------------|------------------------------------------------------|-----------------------------------------------------------------------------------------|
| B       | 3 x In       | 0.1 < t < 45s (In ≤ 32A)<br>0.1 < t < 90s (In > 32A) | Only for resistive loads such as:<br>- electrical heating<br>- water heater<br>- stoves |
|         | 5 x In       | t < 0.1s                                             |                                                                                         |
| C       | 5 x In       | 0.1 < t < 15s (In ≤ 32A)<br>0.1 < t < 30s (In > 32A) | Usual loads such as:<br>- lighting<br>- socket-outlets<br>- small motors                |
|         | 10 x In      | t < 0.1s                                             |                                                                                         |

## Thermal release

The release is initiated by a bimetal strip in case of overload. The standard defines the range of releases for specific overload values.

Reference ambient temperature is 30°C.

| Test current | Tripping time                                       |
|--------------|-----------------------------------------------------|
| 1.13 x In    | t ≥ 1h (In ≤ 63A)<br>t ≥ 2h (In > 63A)              |
| 1.45 x In    | t < 1h (In ≤ 63A)<br>t < 2h (In > 63A)              |
| 2.55 x In    | 1s < t < 60s (In ≤ 32A)<br>1s < t < 120s (In > 32A) |

## Influence of ambient air temperature on the rated current

The maximum value of the current which can flow through an MCB depends of the nominal current of the MCB, the conductor cross-section as well as of the ambient air temperature.

The values shown in the diagram below are for devices in free air.

For devices installed with other modular devices in the same switchboard a correction factor (K) shall be applied relative to the mounting situation of the MCB, the ambient temperature and the number of main circuits in the installation (EN 60439-1):

| No. of rows in enclosure | K   |
|--------------------------|-----|
| 2 or 3                   | 0.9 |
| 4 or 5                   | 0.8 |
| 6 to 9                   | 0.7 |
| > 10                     | 0.6 |

### Calculation example

Within a distribution panel consisting of eight rows each 6 of 2 pole C16 with an operating ambient temperature of 45°C, which is the highest temperature at which the MCB can operate without unwanted tripping.

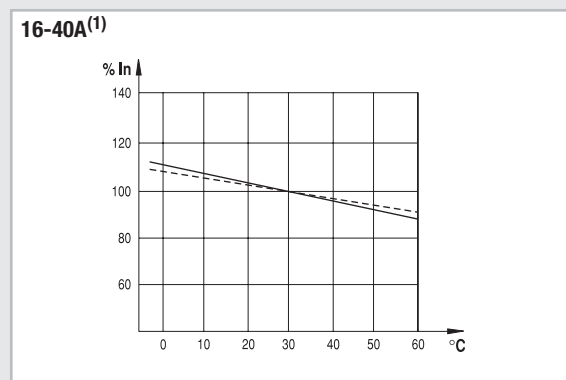
### Calculation

The correction factor K=0.7, for use in an eight rows installation: 16A x 0.7= 11.2A

As the MCB is working at 45°C, another factor shall be applied (90% = 0.9):

$$I_n \text{ at } 45^\circ\text{C} = I_n \text{ at } 30^\circ\text{C} \times 0.9 = 11.2\text{A} \times 0.9 = 10.1\text{A}$$

The thermal calibration of the MCB's was carried out at an ambient temperature of 30°C. Ambient temperatures different from 30°C influence the bimetal and this results in earlier or later thermal tripping.



(1) Other ratings see page A.31

## Tripping current as a function of the frequency

All MCB's are designed to work at frequencies of 50-60 Hz, therefore to work at different values, consideration must be given to the variation of the tripping characteristics.

The thermal tripping does not change with variation of the frequency but the magnetic tripping values can be up to 50% higher than the ones at 50-60 Hz. For DC current magnetic tripping is 50% higher.

## Tripping current variations

| 60Hz | 100Hz | 200Hz | 300Hz | 400Hz |
|------|-------|-------|-------|-------|
| 1    | 1.1   | 1.2   | 1.4   | 1.5   |

## Power losses

The power losses are calculated by measuring the voltage drop between the incoming and the outgoing terminals of the device at rated current.

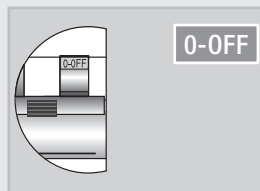
## Power losses per pole

| In (A) | Voltage drop (V) | Energy loss Pw (W) | Resistance Z (mOhm) |
|--------|------------------|--------------------|---------------------|
| 2      | 0.55             | 1.1                | 275.00              |
| 4      | 0.34             | 1.35               | 84.38               |
| 6      | 0.25             | 1.52               | 42.22               |
| 10     | 0.16             | 1.64               | 16.40               |
| 16     | 0.13             | 2.1                | 8.20                |
| 20     | 0.13             | 2.52               | 6.30                |
| 25     | 0.12             | 3.1                | 4.96                |
| 32     | 0.12             | 3.8                | 3.71                |
| 40     | 0.11             | 4.46               | 2.79                |

## Toggle<sup>(1)</sup>

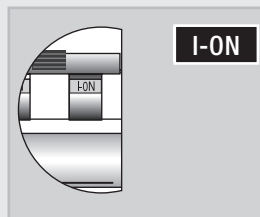
The toggle permits to switch the MCB ON or OFF

Printing on the toggle provides information of the real contact position.



### 0-OFF

Contacts in open position. Ensures a distance between contacts > 5mm in the Unibis™ range.



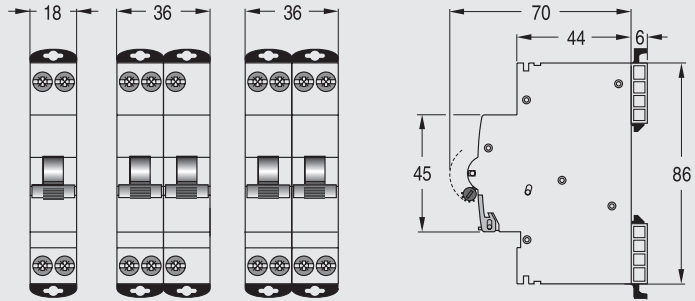
### I-ON

Contacts in closed position. Ensures continuity in the main circuit.

(1) Not applicable for Series DA41N

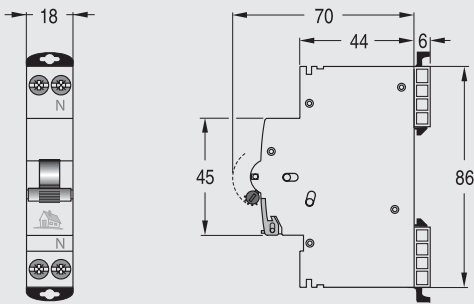
## Dimensional drawings

### Miniature Circuit Breakers - Series EC 91.NR, EC9 11, EC 90



A

### Miniature Circuit Breakers - Series DA 41 N



### Auxiliary interface - Series CA

