

**Contactor, 3 pole, 380 V 400 V 37 kW, 220 V 50 Hz, 240 V 60 Hz, AC operation, Screw terminals**



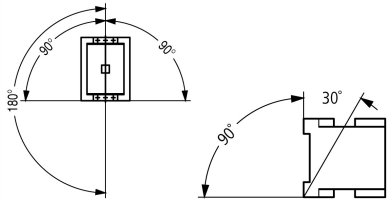
**Part no.** DILM72(220V50HZ,240V60HZ)  
**Catalog No.** 109193  
**Alternate Catalog No.** XTCE072D00B

## Delivery program

|   |                |    |  |  |
|---|----------------|----|--|--|
| Product range   |                |    |  | Contactors   |
| Application   |                |    |  | Contactors for Motors  |
| Subrange  |                |    |  | Contactors up to 170 A, 3 pole   |
| Utilization category                                      |                |    |  | AC-1: Non-inductive or slightly inductive loads, resistance furnaces<br>NAC-3: Normal AC induction motors: starting, switch off during running<br>AC-4: Normal AC induction motors: starting, plugging, reversing, inching |
| Notes   |                |    |  | Not suitable for motors with efficiency class IE3.   |
| Connection technique                                      |                |    |  | Screw terminals  |
| Number of poles   |                |    |  | 3 pole   |
| <b>Rated operational current</b>                          |                |    |  |  |
| AC-3  |                |    |  |  |
| Notes   |                |    |  | At maximum permissible ambient temperature (open.)   |
| 380 V 400 V   | $I_e$          | A  |  | 72   |
| AC-1  |                |    |  |  |
| Conventional free air thermal current, 3 pole, 50 - 60 Hz |                |    |  |  |
| Open  |                |    |  |  |
| at 40 °C  | $I_{th} = I_e$ | A  |  | 98   |
| enclosed  | $I_{th}$       | A  |  | 72   |
| Conventional free air thermal current, 1 pole             |                |    |  |  |
| open  | $I_{th}$       | A  |  | 200  |
| enclosed  | $I_{th}$       | A  |  | 180  |
| <b>Max. rating for three-phase motors, 50 - 60 Hz</b>     |                |    |  |  |
| AC-3  |                |    |  |  |
| 220 V 230 V   | P              | kW |  | 22   |
| 380 V 400 V   | P              | kW |  | 37   |
| 660 V 690 V   | P              | kW |  | 35   |
| AC-4  |                |    |  |  |
| 220 V 230 V   | P              | kW |  | 7  |
| 380 V 400 V   | P              | kW |  | 12   |
| 660 V 690 V   | P              | kW |  | 17   |
| Contact sequence  |                |    |  |  |
| <b>Instructions</b>                                       |                |    |  | Contacts to EN 50 012.<br>Observe electrical lifespan.   |
| Can be combined with auxiliary contact                    |                |    |  | DILM150-XHI(V)...<br>DILM1000-XHI(V)...  |
| Actuating voltage   |                |    |  | 220 V 50 Hz, 240 V 60 Hz   |
| Voltage AC/DC   |                |    |  | AC operation   |
| Connection to SmartWire-DT                                |                |    |  | no   |
| Frame size  |                |    |  | 3  |

## Technical data

|                                 |            |               |  |                                 |
|---------------------------------|------------|---------------|--|---------------------------------|
| <b>General</b>                  |            |               |  |                                 |
| Standards                       |            |               |  | IEC/EN 60947, VDE 0660, UL, CSA |
| Lifespan, mechanical            |            |               |  |                                 |
| AC operated                     | Operations | $\times 10^6$ |  | 10                              |
| Operating frequency, mechanical |            |               |  |                                 |

|   |                                     |  |
|---|-------------------------------------|--|
| AC operated   | Operations/h                        | 5000   |
| Climatic proofing   |                                     | Damp heat, constant, to IEC 60068-2-78<br>Damp heat, cyclic, to IEC 60068-2-30     |
| Ambient temperature   |                                     |  |
| Open  | °C                                  | -25 - +60  |
| Enclosed  | °C                                  | - 25 - 40  |
| Storage   | °C                                  | - 40 - 80  |
| Mounting position   |                                     |  |
| Mechanical shock resistance (IEC/EN 60068-2-27)                       |                                     |  |
| Half-sinusoidal shock, 10 ms  |                                     |  |
| Main contacts   |                                     |  |
| N/O contact   | g                                   | 10   |
| Auxiliary contacts  |                                     |  |
| N/O contact   | g                                   | 7  |
| N/C contact   | g                                   | 5  |
| Mechanical shock resistance (IEC/EN 60068-2-27) when tabletop-mounted |                                     |  |
| Half-sinusoidal shock, 10 ms  |                                     |  |
| Main contacts   |                                     |  |
| N/O contact   | g                                   | 10   |
| Auxiliary contacts  |                                     |  |
| N/O contact   | g                                   | 7  |
| N/C contact   | g                                   | 5  |
| Degree of Protection  |                                     | IP00   |
| Protection against direct contact when actuated from front (EN 50274) |                                     | Finger and back-of-hand proof  |
| Altitude  | m                                   | Max. 2000  |
| Weight  |                                     |  |
| AC operated   | kg                                  | 0.87   |
| Screw connector terminals   |                                     |  |
| Terminal capacity main cable  |                                     |  |
| Solid   | mm <sup>2</sup>                     | 1 x (0.75 - 16)<br>2 x (0.75 - 16)   |
| Flexible with ferrule   | mm <sup>2</sup>                     | 1 x (0.75 - 35)<br>2 x (0.75 - 25)   |
| Solid or stranded   | AWG                                 | single 14 - 1, double 14 - 2   |
| Flat conductor  | Lamellenzahl<br>x Breite x<br>Dicke | mm 2 x (6 x 9 x 0.8)   |
| Stripping length  | mm                                  | 14   |
| Terminal screw  |                                     | M6   |
| Tightening torque   | Nm                                  | 3.3  |
| Tool  |                                     |  |
| Pozidriv screwdriver  | Size                                | 2  |
| Standard screwdriver  | mm                                  | 0.8 x 5.5<br>1 x 6   |
| Terminal capacity control circuit cables                              |                                     |  |
| Solid   | mm <sup>2</sup>                     | 1 x (0.75 - 4)<br>2 x (0.75 - 2.5)   |
| Flexible with ferrule   | mm <sup>2</sup>                     | 1 x (0.75 - 2.5)<br>2 x (0.75 - 2.5)   |
| Solid or stranded   | AWG                                 | 18 - 14  |
| Stripping length  | mm                                  | 10   |
| Terminal screw  |                                     | M3.5   |
| Tightening torque   | Nm                                  | 1.2  |
| Tool  |                                     |  |

|                      |      |                    |
|----------------------|------|--------------------|
| Pozidriv screwdriver | Size | 2                  |
| Standard screwdriver | mm   | 0.8 x 5.5<br>1 x 6 |

### Main conducting paths

|  |                |      |       |
|--|----------------|------|-------|
| Rated impulse withstand voltage        | $U_{imp}$      | V AC | 8000  |
| Overvoltage category/pollution degree  |                |      | III/3 |
| Rated insulation voltage               | $U_i$          | V AC | 690   |
| Rated operational voltage              | $U_e$          | V AC | 690   |
| Safe isolation to EN 61140             |                |      |       |
| between coil and contacts              |                | V AC | 440   |
| between the contacts                   |                | V AC | 440   |
| Making capacity (p.f. to IEC/EN 60947) |                |      |       |
|  | $U_p$ to 690 V | A    | 910   |
| Breaking capacity                      |                |      |       |
| 220 V 230 V                            |                | A    | 650   |
| 380 V 400 V                            |                | A    | 650   |
| 500 V                                  |                | A    | 650   |
| 660 V 690 V                            |                | A    | 370   |
| Short-circuit rating                   |                |      |       |
| Short-circuit protection maximum fuse  |                |      |       |
| Type "2" coordination                  |                |      |       |
| 400 V                                  | gG/gL 500 V    | A    | 125   |
| 690 V                                  | gG/gL 690 V    | A    | 80    |
| Type "1" coordination                  |                |      |       |
| 400 V                                  | gG/gL 500 V    | A    | 250   |
| 690 V                                  | gG/gL 690 V    | A    | 100   |

### AC

|   |                |     |  |
|---|----------------|-----|--|
| AC-1  |                |     |  |
| Rated operational current                                 |                |     |  |
| Conventional free air thermal current, 3 pole, 50 - 60 Hz |                |     |  |
| Open  |                |     |  |
| at 40 °C  | $I_{th} = I_e$ | A   | 98   |
| at 50 °C  | $I_{th} = I_e$ | A   | 88   |
| at 55 °C  | $I_{th} = I_e$ | A   | 83   |
| at 60 °C  | $I_{th} = I_e$ | A   | 80   |
| enclosed  | $I_{th}$       | A   | 72   |
| Conventional free air thermal current, 1 pole             |                |     |  |
| open  | $I_{th}$       | A   | 200  |
| enclosed  | $I_{th}$       | A   | 180  |
| AC-3  |                |     |  |
| Rated operational current                                 |                |     |  |
| Open, 3-pole: 50 – 60 Hz                                  |                |     |  |
| Notes   |                |     | At maximum permissible ambient temperature (open.) |
| 220 V 230 V   | $I_e$          | A   | 72   |
| 240 V   | $I_e$          | A   | 72   |
| 380 V 400 V   | $I_e$          | A   | 72   |
| 415 V   | $I_e$          | A   | 72   |
| 440V  | $I_e$          | A   | 72   |
| 500 V   | $I_e$          | A   | 72   |
| 660 V 690 V   | $I_e$          | A   | 37   |
| Motor rating  | P              | kWh |  |
| 220 V 230 V   | P              | kW  | 22   |
| 240V  | P              | kW  | 25   |
| 380 V 400 V   | P              | kW  | 37   |
| 415 V   | P              | kW  | 41   |

|                          |                |    |     |
|--------------------------|----------------|----|-----|
| 440 V                    | P              | kW | 44  |
| 500 V                    | P              | kW | 50  |
| 660 V 690 V              | P              | kW | 35  |
| <b>AC-4</b>              |                |    |     |
| Open, 3-pole: 50 – 60 Hz |                |    |     |
| 220 V 230 V              | I <sub>e</sub> | A  | 25  |
| 240 V                    | I <sub>e</sub> | A  | 25  |
| 380 V 400 V              | I <sub>e</sub> | A  | 25  |
| 415 V                    | I <sub>e</sub> | A  | 25  |
| 440 V                    | I <sub>e</sub> | A  | 25  |
| 500 V                    | I <sub>e</sub> | A  | 25  |
| 660 V 690 V              | I <sub>e</sub> | A  | 20  |
| Motor rating             |                |    |     |
| 220 V 230 V              | P              | kW | 7   |
| 240 V                    | P              | kW | 7.5 |
| 380 V 400 V              | P              | kW | 12  |
| 415 V                    | P              | kW | 13  |
| 440 V                    | P              | kW | 14  |
| 500 V                    | P              | kW | 16  |
| 660 V 690 V              | P              | kW | 17  |

## DC

|                                 |                |   |    |
|---------------------------------|----------------|---|----|
| Rated operational current, open |                |   |    |
| DC-1                            |                |   |    |
| 60 V                            | I <sub>e</sub> | A | 72 |
| 110 V                           | I <sub>e</sub> | A | 72 |
| 220 V                           | I <sub>e</sub> | A | 65 |

## Current heat loss

|   |  |    |      |
|---|--|----|------|
| 3 pole, at I <sub>th</sub> (60°)                  |  | W  | 25.9 |
| Current heat loss at I <sub>e</sub> to AC-3/400 V |  | W  | 21   |
| Impedance per pole                                |  | mΩ | 1.9  |

## Magnet systems

|  |          |                  |           |
|--|----------|------------------|-----------|
| Voltage tolerance  |          |                  |           |
| AC operated  | Pick-up  | x U <sub>c</sub> | 0.8 - 1.1 |
| Drop-out voltage AC operated   | Drop-out | x U <sub>c</sub> | 0.3 - 0.6 |
| Power consumption of the coil in a cold state and 1.0 x U <sub>S</sub> |          |                  |           |
| 50 Hz  | Pick-up  | VA               | 149       |
| 50 Hz  | Sealing  | VA               | 16        |
| 50 Hz  | Sealing  | W                | 4.1       |
| 60 Hz  | Pick-up  | VA               | 178       |
| 60 Hz  | Sealing  | VA               | 19        |
| 60 Hz  | Sealing  | W                | 4.1       |
| Duty factor  |          | % DF             | 100       |
| Changeover time at 100 % U <sub>S</sub> (recommended value)            |          |                  |           |
| Main contacts  |          |                  |           |
| AC operated  |          |                  |           |
| Closing delay  |          | ms               | 12 - 18   |
| Opening delay  |          | ms               | 8 - 13    |
| Arcing time  |          | ms               | 10        |

## Electromagnetic compatibility (EMC)

|                       |  |  |                         |
|-----------------------|--|--|-------------------------|
| Emitted interference  |  |  | according to EN 60947-1 |
| Interference immunity |  |  | according to EN 60947-1 |

## Rating data for approved types

|                      |  |  |  |
|----------------------|--|--|--|
| Switching capacity   |  |  |  |
| Maximum motor rating |  |  |  |
| Three-phase          |  |  |  |

|   |      |                 |
|---|------|-----------------|
| 200 V<br>208 V  | HP   | 20              |
| 230 V<br>240 V  | HP   | 25              |
| 460 V<br>480 V  | HP   | 50              |
| 575 V<br>600 V  | HP   | 60              |
| Single-phase  |      |                 |
| 115 V<br>120 V  | HP   | 5               |
| 230 V<br>240 V  | HP   | 15              |
| General use   | A    | 88              |
| Short Circuit Current Rating                              | SCCR |                 |
| Basic Rating  |      |                 |
| SCCR  | kA   | 10              |
| max. Fuse   | A    | 250             |
| max. CB   | A    | 250             |
| 480 V High Fault  |      |                 |
| SCCR (fuse)   | kA   | 30/100          |
| max. Fuse   | A    | 250/150 Class J |
| SCCR (CB)   | kA   | 65              |
| max. CB   | A    | 100             |
| 600 V High Fault  |      |                 |
| SCCR (fuse)   | kA   | 30/100          |
| max. Fuse   | A    | 250/150 Class J |
| SCCR (CB)   | kA   | 30              |
| max. CB   | A    | 250             |
| Special Purpose Ratings                                   |      |                 |
| Electrical Discharge Lamps (Ballast)                      |      |                 |
| 480V 60Hz 3phase, 277V 60Hz 1phase                        | A    | 88              |
| 600V 60Hz 3phase, 347V 60Hz 1phase                        | A    | 88              |
| Incandescent Lamps (Tungsten)                             |      |                 |
| 480V 60Hz 3phase, 277V 60Hz 1phase                        | A    | 88              |
| 600V 60Hz 3phase, 347V 60Hz 1phase                        | A    | 88              |
| Resistance Air Heating                                    |      |                 |
| 480V 60Hz 3phase, 277V 60Hz 1phase                        | A    | 88              |
| 600V 60Hz 3phase, 347V 60Hz 1phase                        | A    | 88              |
| Definite Purpose Ratings (100,000 cycles acc. to UL 1995) |      |                 |
| LRA 480V 60Hz 3phase                                      | A    | 432             |
| FLA 480V 60Hz 3phase                                      | A    | 72              |
| Elevator Control  |      |                 |
| 200V 60Hz 3phase  | HP   | 10              |
| 200V 60Hz 3phase  | A    | 32.2            |
| 240V 60Hz 3phase  | HP   | 15              |
| 240V 60Hz 3phase  | A    | 42              |
| 480V 60Hz 3phase  | HP   | 30              |
| 480V 60Hz 3phase  | A    | 40              |
| 600V 60Hz 3phase  | HP   | 40              |
| 600V 60Hz 3phase  | A    | 41              |

## Design verification as per IEC/EN 61439

| Technical data for design verification                   |           |   |    |
|--|-----------|---|----|
| Rated operational current for specified heat dissipation | $I_n$     | A | 72 |
| Heat dissipation per pole, current-dependent             | $P_{vid}$ | W | 7  |
| Equipment heat dissipation, current-dependent            | $P_{vid}$ | W | 21 |

|  |                   |    |  |
|--|-------------------|----|--|
| Static heat dissipation, non-current-dependent   | P <sub>vs</sub>   | W  | 4.1  |
| Heat dissipation capacity  | P <sub>diss</sub> | W  | 0  |
| Operating ambient temperature min.   |                   | °C | -25  |
| Operating ambient temperature max.   |                   | °C | 60   |
| 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

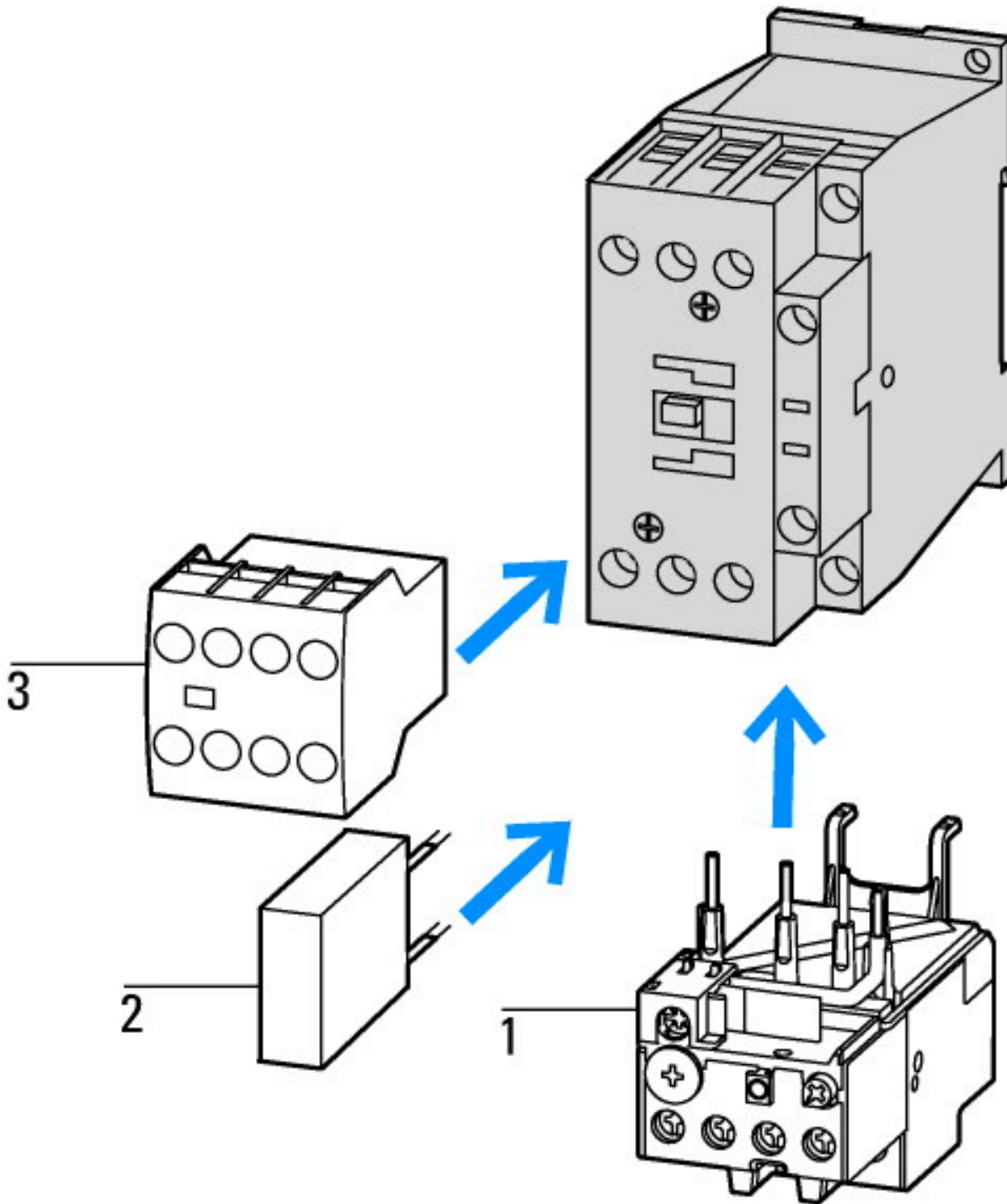
|   |  |    |                  |
|---|--|----|------------------|
| Low-voltage industrial components (EG000017) / Power contactor, AC switching (EC000066)   |  |    |                  |
| Electric engineering, automation, process control engineering / Low-voltage switch technology / Contactor (LV) / Power contactor, AC switching (ecl@ss10.0.1-27-37-10-03 [AAB718015]) |  |    |                  |
| Rated control supply voltage U <sub>s</sub> at AC 50HZ  |  | V  | 0 - 220          |
| Rated control supply voltage U <sub>s</sub> at AC 60HZ  |  | V  | 0 - 240          |
| Rated control supply voltage U <sub>s</sub> at DC   |  | V  | 0 - 0            |
| Voltage type for actuating  |  |    | AC               |
| Rated operation current I <sub>e</sub> at AC-1, 400 V   |  | A  | 98               |
| Rated operation current I <sub>e</sub> at AC-3, 400 V   |  | A  | 72               |
| Rated operation power at AC-3, 400 V  |  | kW | 37               |
| Rated operation current I <sub>e</sub> at AC-4, 400 V   |  | A  | 25               |
| Rated operation power at AC-4, 400 V  |  | kW | 12               |
| Rated operation power NEMA  |  | kW | 37               |
| Modular version   |  |    | No               |
| Number of auxiliary contacts as normally open contact   |  |    | 0                |
| Number of auxiliary contacts as normally closed contact   |  |    | 0                |
| Type of electrical connection of main circuit   |  |    | Screw connection |
| Number of normally closed contacts as main contact  |  |    | 0                |
| Number of main contacts as normally open contact  |  |    | 3                |

## Approvals

|                   |  |  |  |
|-------------------|--|--|--|
| Product Standards |  |  | IEC/EN 60947-4-1; UL 60947-4-1; CSA - C22.2 No. 60947-4-1-14; CE marking |
| UL File No.       |  |  | E29096   |

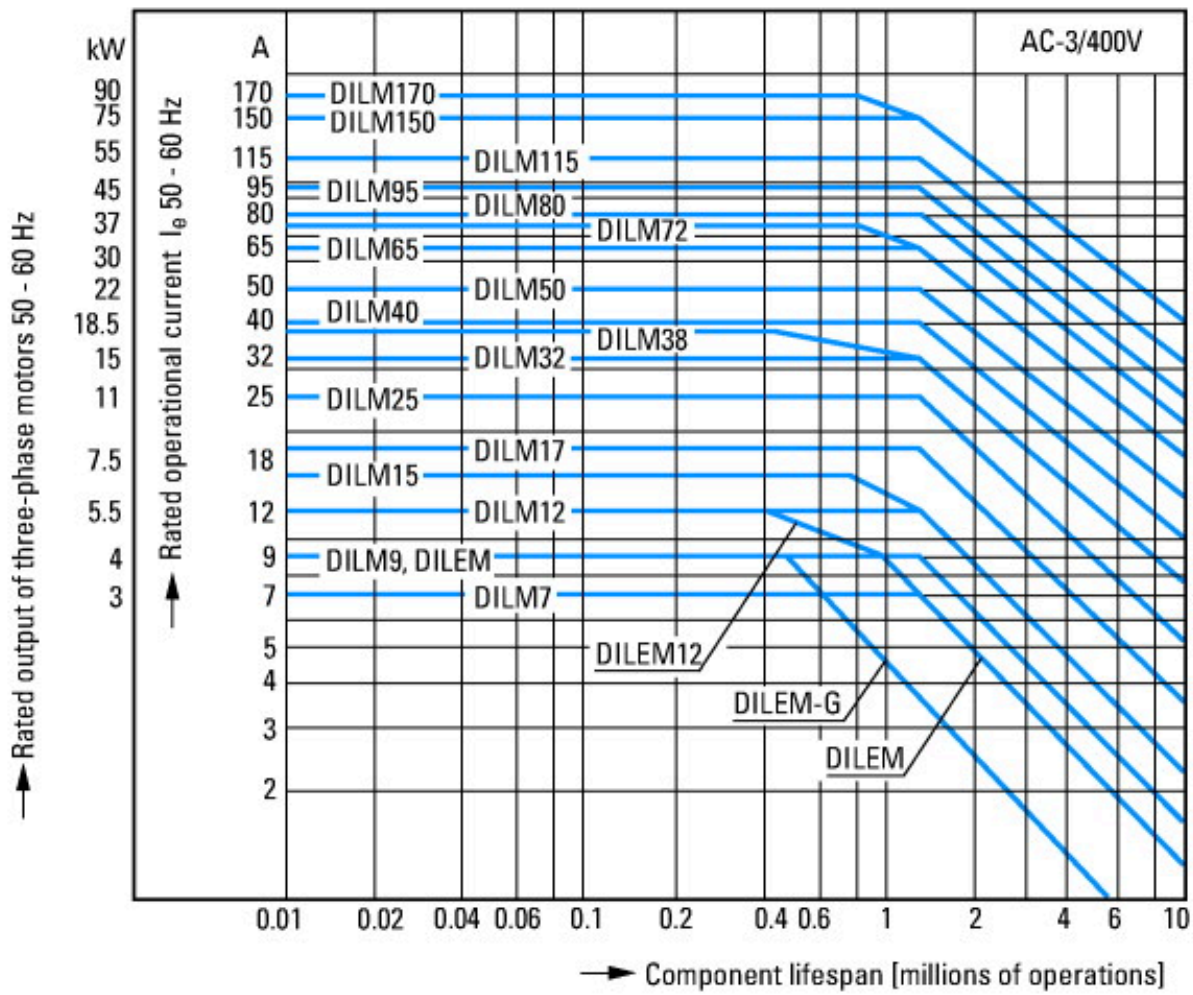
|                                      |                          |
|--------------------------------------|--------------------------|
| UL Category Control No.              | NLDX                     |
| CSA File No.                         | 012528                   |
| CSA Class No.                        | 2411-03, 3211-04         |
| North America Certification          | UL listed, CSA certified |
| Specially designed for North America | No                       |

## Characteristics



- 1: Overload relay
- 2: Suppressor
- 3: Auxiliary contact modules

on the side: 2 x DILM1000-XHI(V)11-SI; surface mounting: 1 x DILM150-XHIA11  
on the side: 2 x DILM1000-XHI(V)11-SA; surface mounting: 1 x DILM150-XHI (2 pole)  
on the side: 1 x DILM1000-XHI(V)11-SI; surface mounting: 1 x DILM150-XHIA22  
on the side: 1 x DILM1000-XHI(V)11-SA; surface mounting: 1 x DILM150-XHI (4 pole)

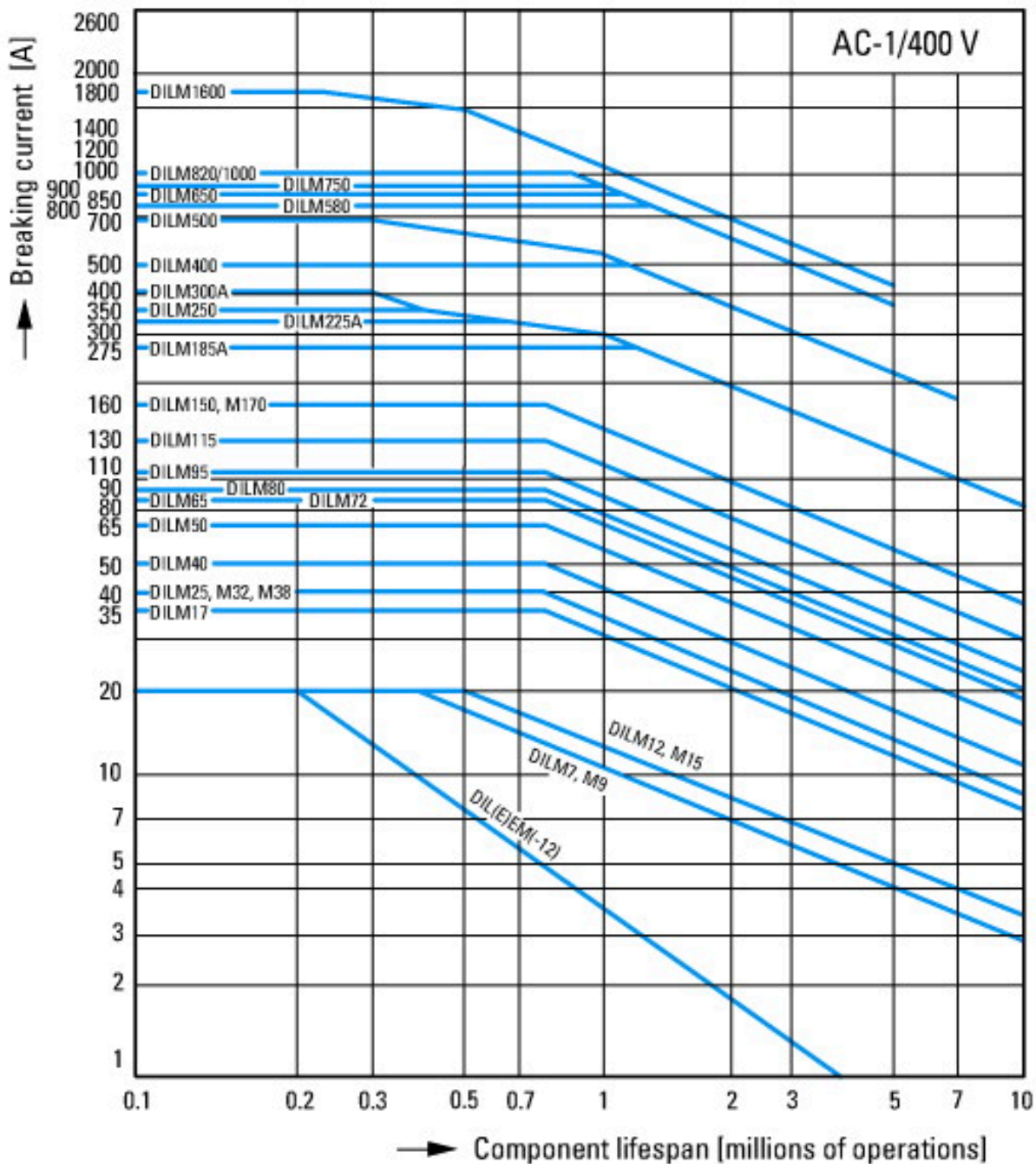


Normal AC induction motor  
 Operating characteristics  
 Switch on: from stop  
 Switch off: during run  
 Electrical characteristics:  
 Switch on: up to 6 x Rated motor current  
 Switch off: up to 1 x Rated motor current  
 Utility category





Extreme switching duty  
 Normal AC induction motor  
 Operating characteristics  
 Inching, plugging, reversing  
 Electrical characteristics:  
 Switch on: up to 6 x Rated motor current  
 Switch off: up to 6 x Rated motor current  
 Utilization



Switching conditions for non-motor consumers, 3 pole, 4 pole  
 Operating characteristics  
 Non inductive and slightly inductive loads  
 Electrical characteristics  
 Switch on: 1 x rated operational current  
 Switch off: 1 x rated operational current  
 Utilization category  
 100 % AC-1  
 Typical examples of application  
 Electric heat

## Dimensions

Contactors with auxiliary contact module

side clearance to earthed parts: 6 mm

## Additional product information (links)

|  |   |
|--|---|
| Motor starters and "Special Purpose Ratings" for the North American market                   | <a href="http://www.eaton.eu/ecm/groups/public/@pub/@europe/@electrical/documents/content/pct_3258146.pdf">http://www.eaton.eu/ecm/groups/public/@pub/@europe/@electrical/documents/content/pct_3258146.pdf</a> |
| Switchgear of Power Factor Correction Systems  | <a href="http://www.moeller.net/binary/ver_techpapers/ver934en.pdf">http://www.moeller.net/binary/ver_techpapers/ver934en.pdf</a>   |
| X-Start - Modern Switching Installations Efficiently Fitted and Wired Securely               | <a href="http://www.moeller.net/binary/ver_techpapers/ver938en.pdf">http://www.moeller.net/binary/ver_techpapers/ver938en.pdf</a>   |
| Mirror Contacts for Highly-Reliable Information Relating to Safety-Related Control Functions | <a href="http://www.moeller.net/binary/ver_techpapers/ver944en.pdf">http://www.moeller.net/binary/ver_techpapers/ver944en.pdf</a>   |

|  |   |
|--|---|
| Effect of the Cabel Capacitance of Long Control Cables on the Actuation of Contactors          | <a href="http://www.moeller.net/binary/ver_techpapers/ver949en.pdf">http://www.moeller.net/binary/ver_techpapers/ver949en.pdf</a> |
| Switchgear for Luminaires  | <a href="http://www.moeller.net/binary/ver_techpapers/ver955en.pdf">http://www.moeller.net/binary/ver_techpapers/ver955en.pdf</a> |
| Standard Compliant and Functionally Safe Engineering Design with Mechanical Auxiliary Contacts | <a href="http://www.moeller.net/binary/ver_techpapers/ver956en.pdf">http://www.moeller.net/binary/ver_techpapers/ver956en.pdf</a> |
| The Interaction of Contactors with PLCs  | <a href="http://www.moeller.net/binary/ver_techpapers/ver957en.pdf">http://www.moeller.net/binary/ver_techpapers/ver957en.pdf</a> |
| Busbar Component Adapters for modern Industrial control panels                                 | <a href="http://www.moeller.net/binary/ver_techpapers/ver960en.pdf">http://www.moeller.net/binary/ver_techpapers/ver960en.pdf</a> |